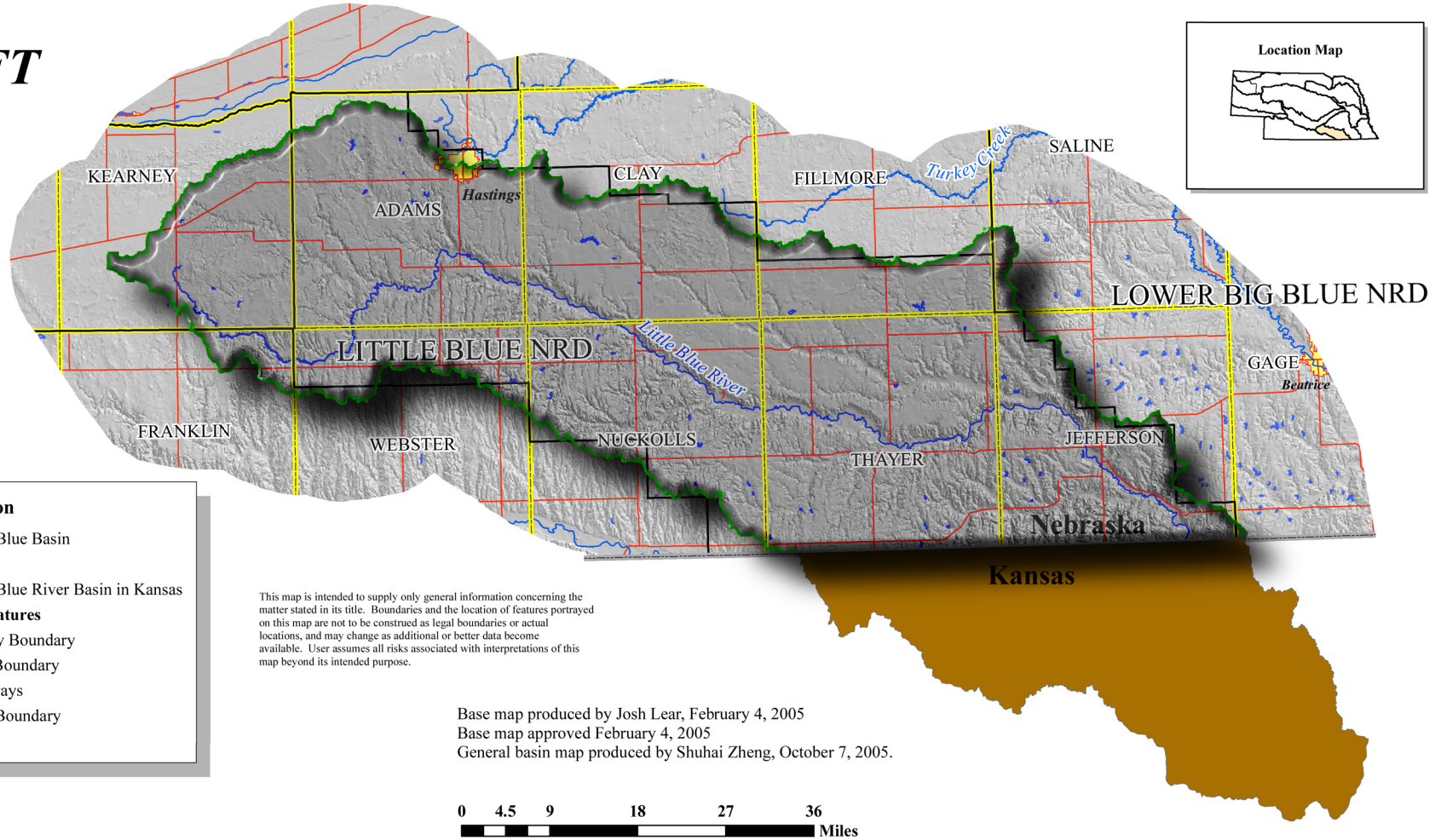
Planning and Assistance Division

GENERAL BASIN MAP

LITTLE BLUE RIVER BASIN

DRAFT



Explanation

- Little Blue Basin
- Lakes
- Little Blue River Basin in Kansas

Cultural Features

- County Boundary
- State Boundary
- Highways
- NRD Boundary
- Cities

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Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
General basin map produced by Shuhai Zheng, October 7, 2005.

0 4.5 9 18 27 36 Miles

Figure LB-1.

Department of Natural Resources

Planning and Assistance Division

General Surface Water Features

LITTLE BLUE RIVER BASIN

N W E S

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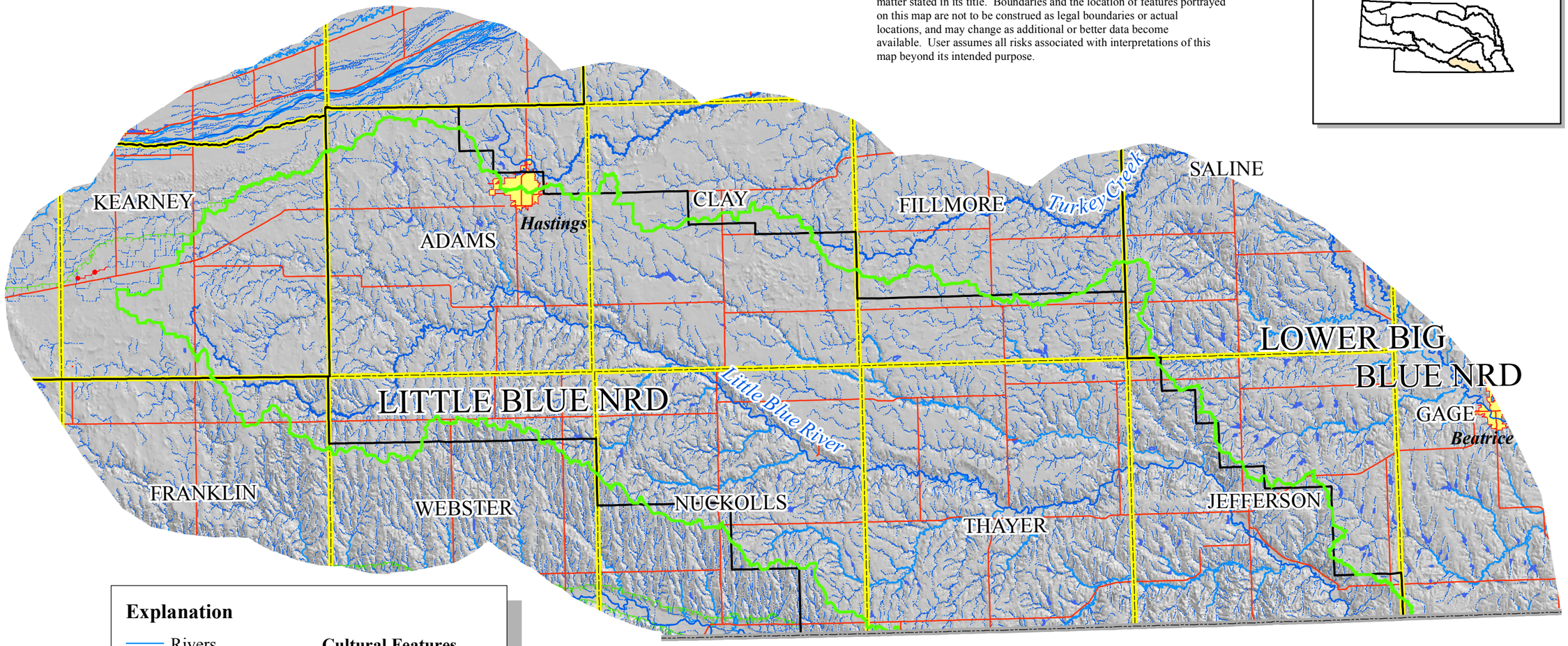
Location Map



Explanation

Rivers	**Cultural Features**
Intermittent Streams	County Boundary
Canals/Ditches	State Boundary
Pipelines	Highways
Lakes	NRD Boundary
Little Blue Basin	Cities

0 4 8 16 24 32 Miles

Figure LB-2.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
General surface water features map produced by Shuhai Zheng, October 7, 2005.

Department of Natural Resources

Planning and Assistance Division

Precipitation Gages

LITTLE BLUE RIVER BASIN

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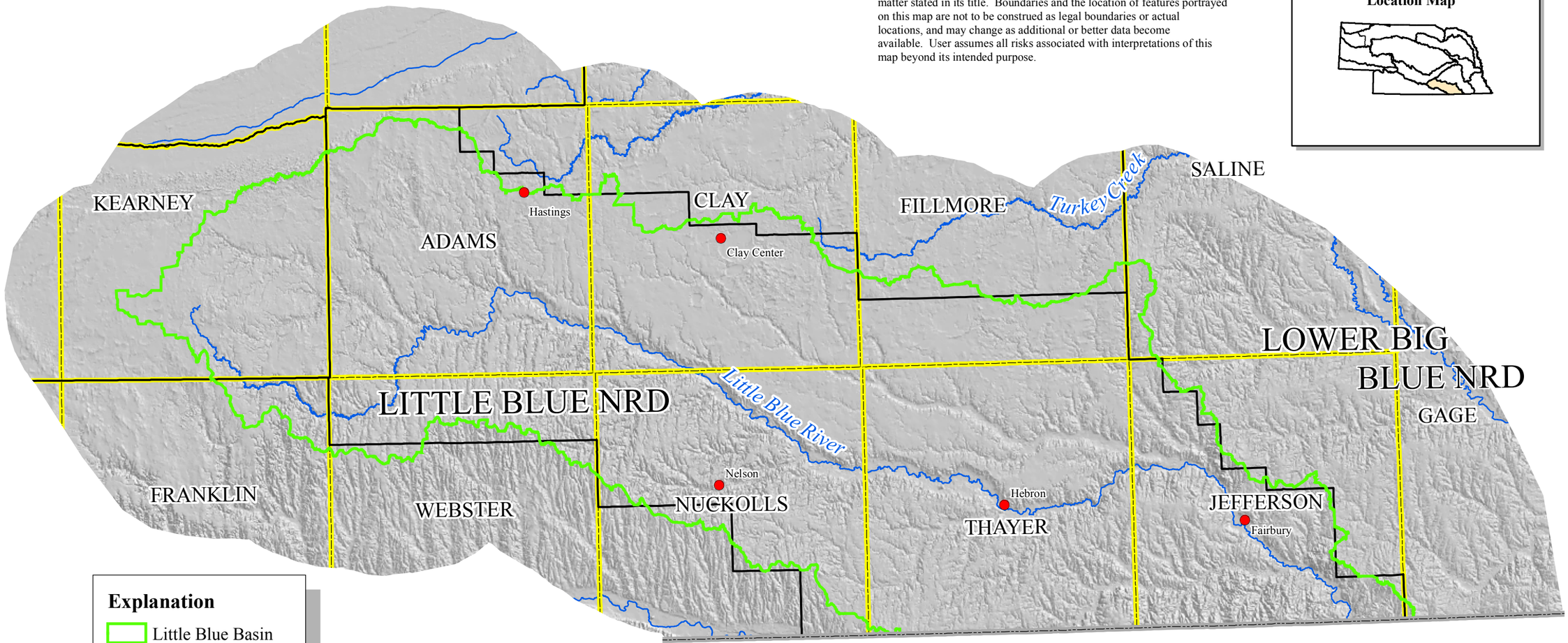
Location Map



Explanation

- Little Blue Basin
- Precipitation Gages

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

Figure LB-3.

0 4 8 16 24 32 **Miles**

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Precipitation gages map produced by Jeff Shafer, October 19, 2005.

Figure LB-4. Annual Precipitation at Clay Center, Nebraska.

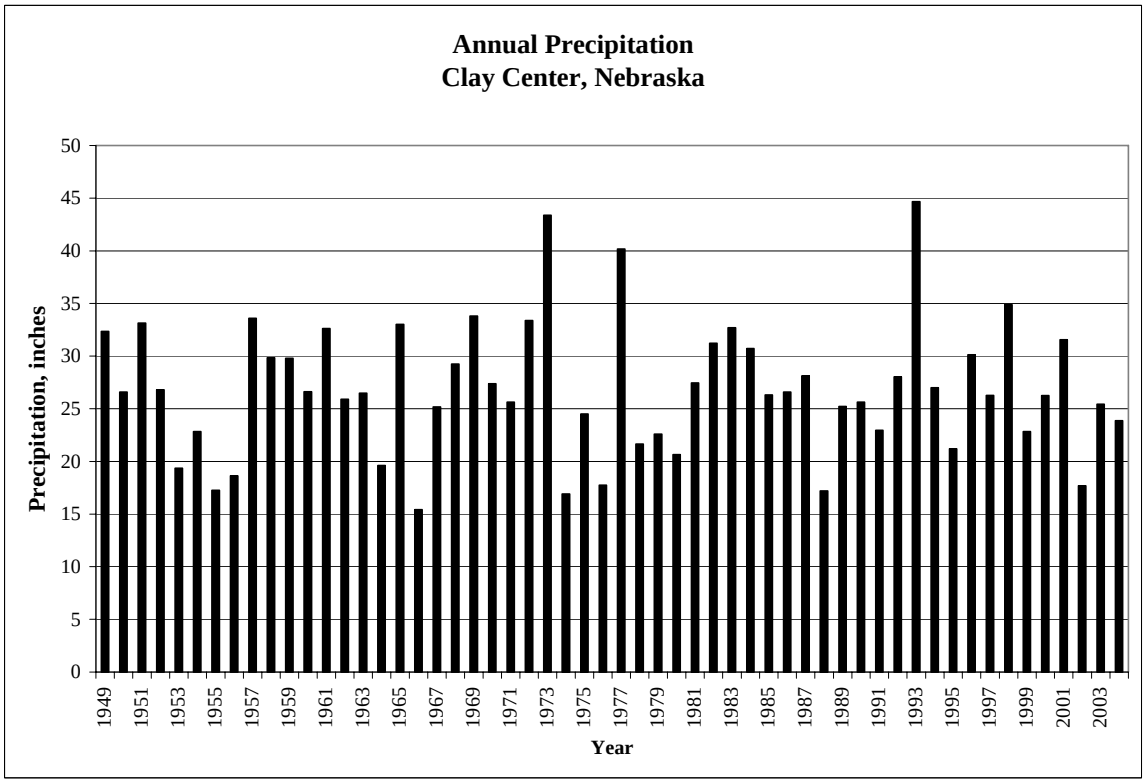


Figure LB-5. Growing Season (May-September) Precipitation at Clay Center, Nebraska.

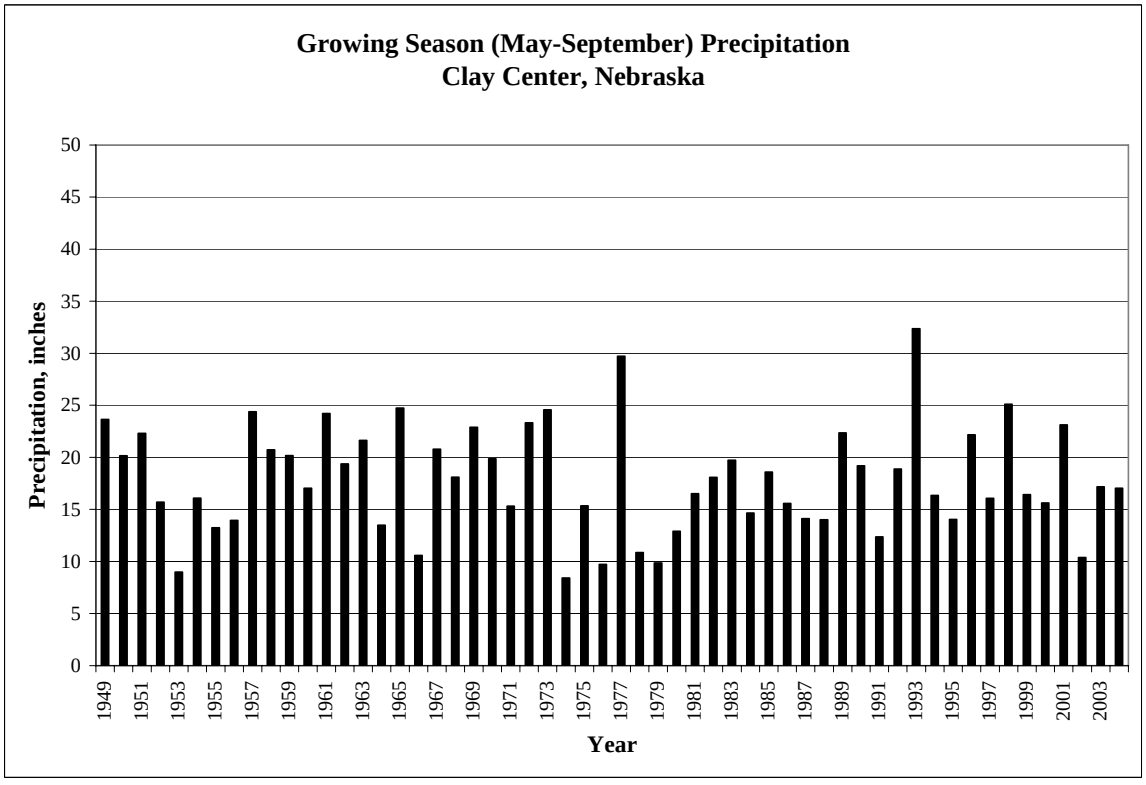


Figure LB-6. Annual Precipitation at Fairbury, Nebraska.

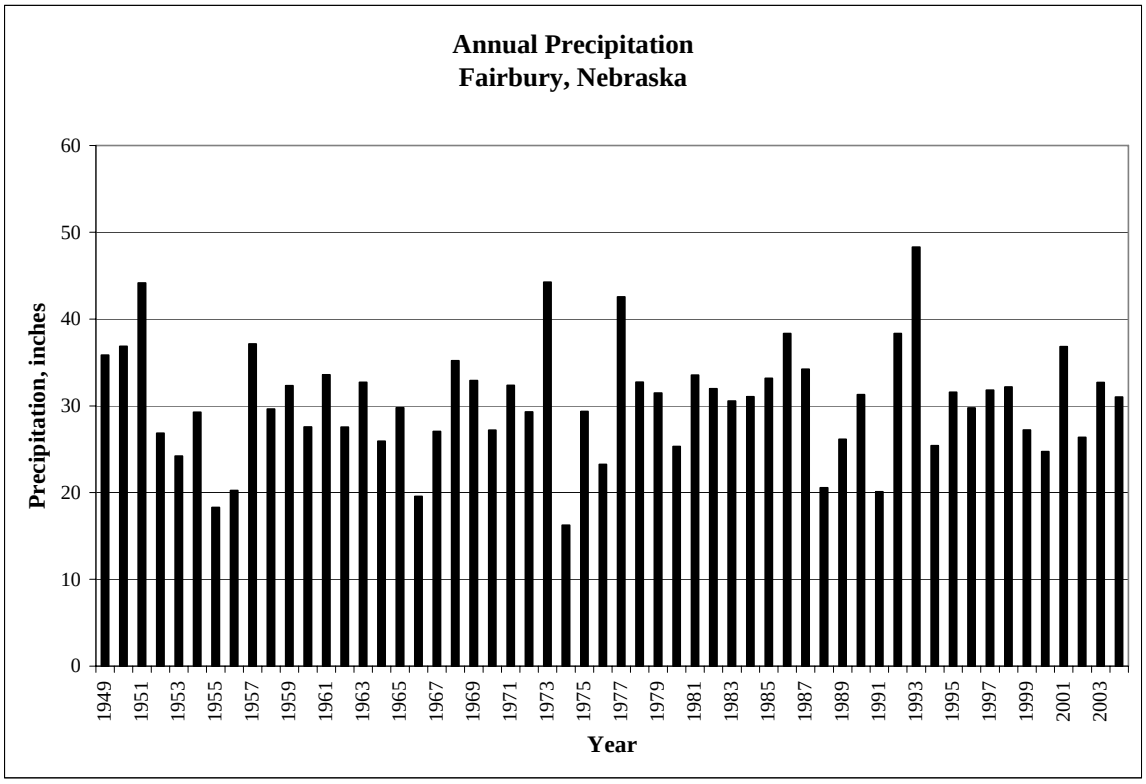


Figure LB-7. Growing Season (May-September) Precipitation at Fairbury, Nebraska.

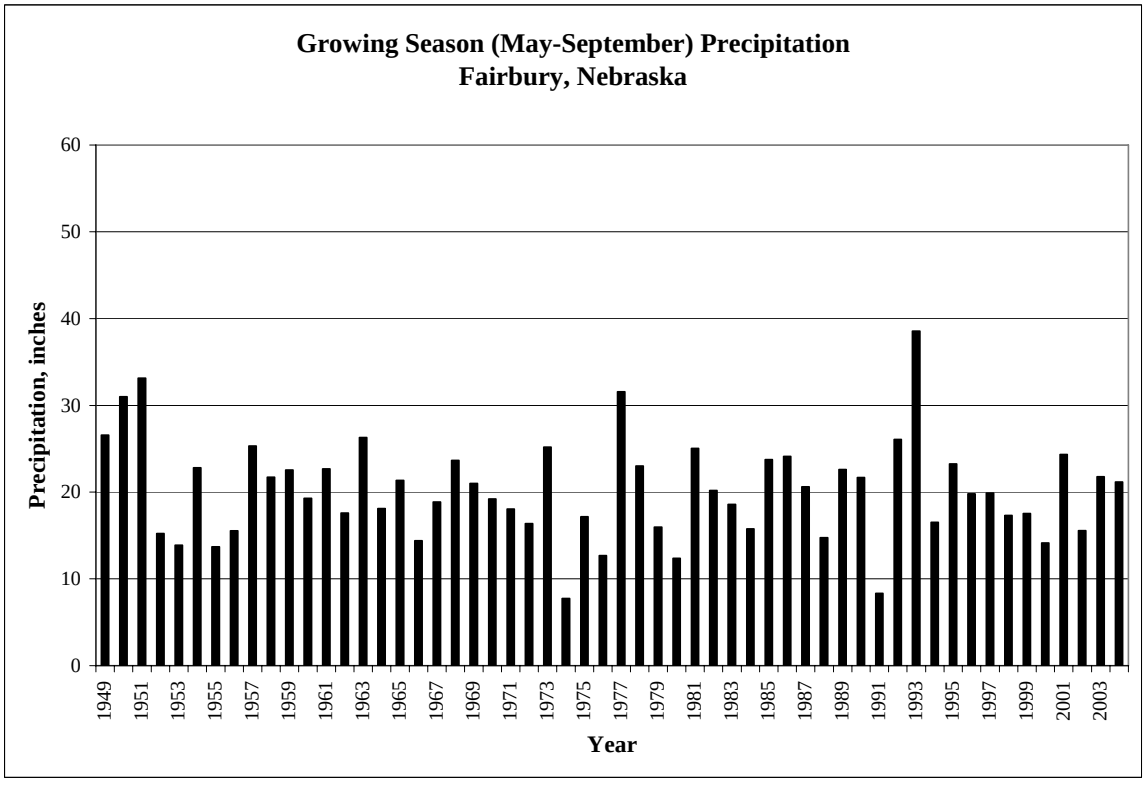


Figure LB-8. Annual Precipitation at Hebron, Nebraska.

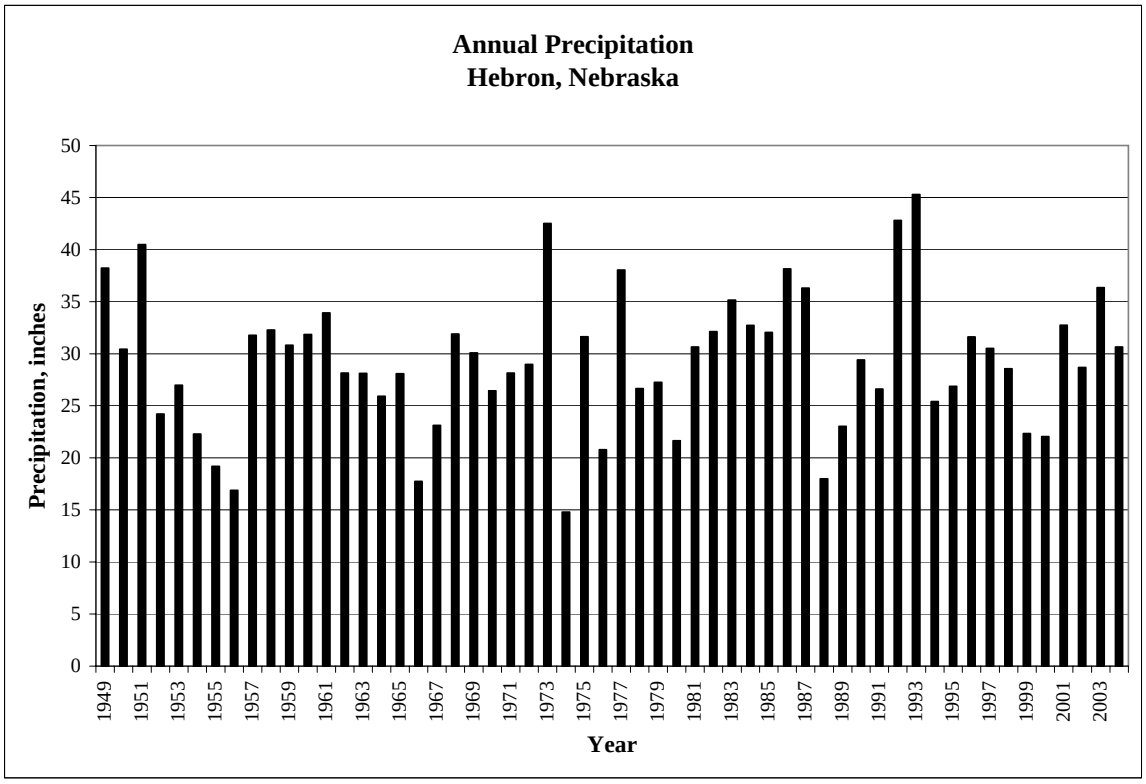


Figure LB-9. Growing Season (May-September) Precipitation at Hebron, Nebraska.

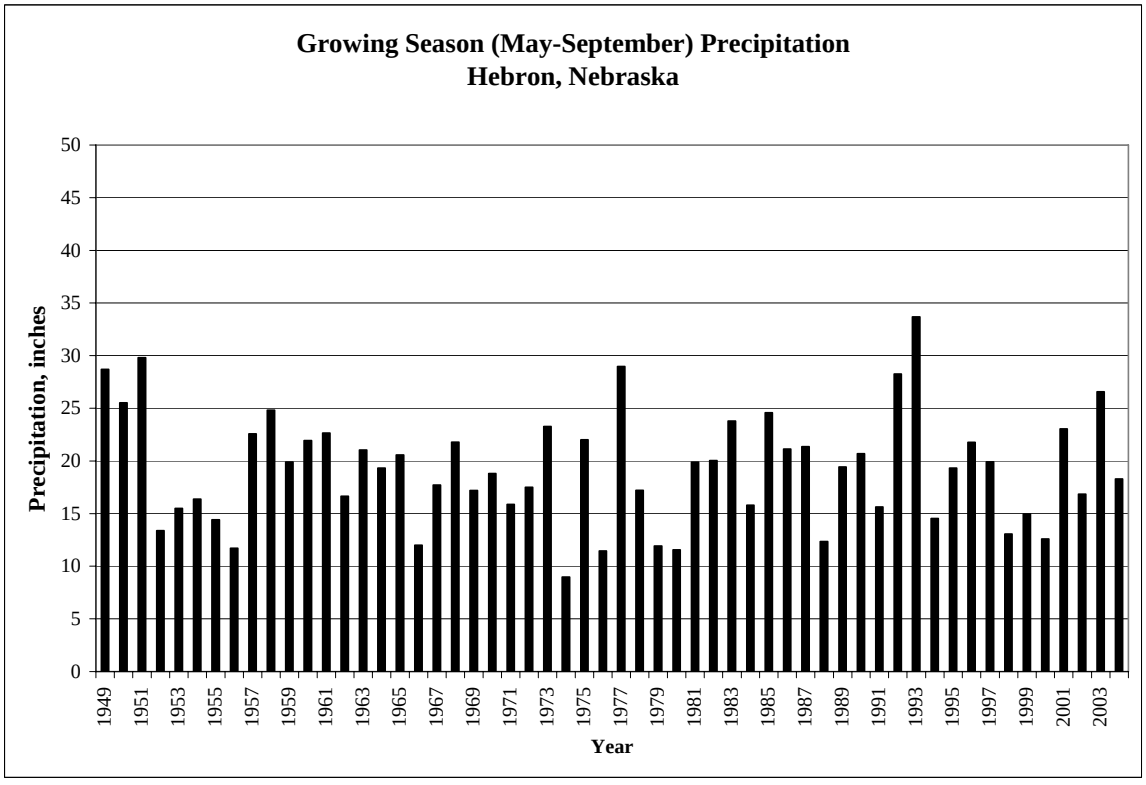


Figure LB-10. Annual Precipitation at Nelson, Nebraska.

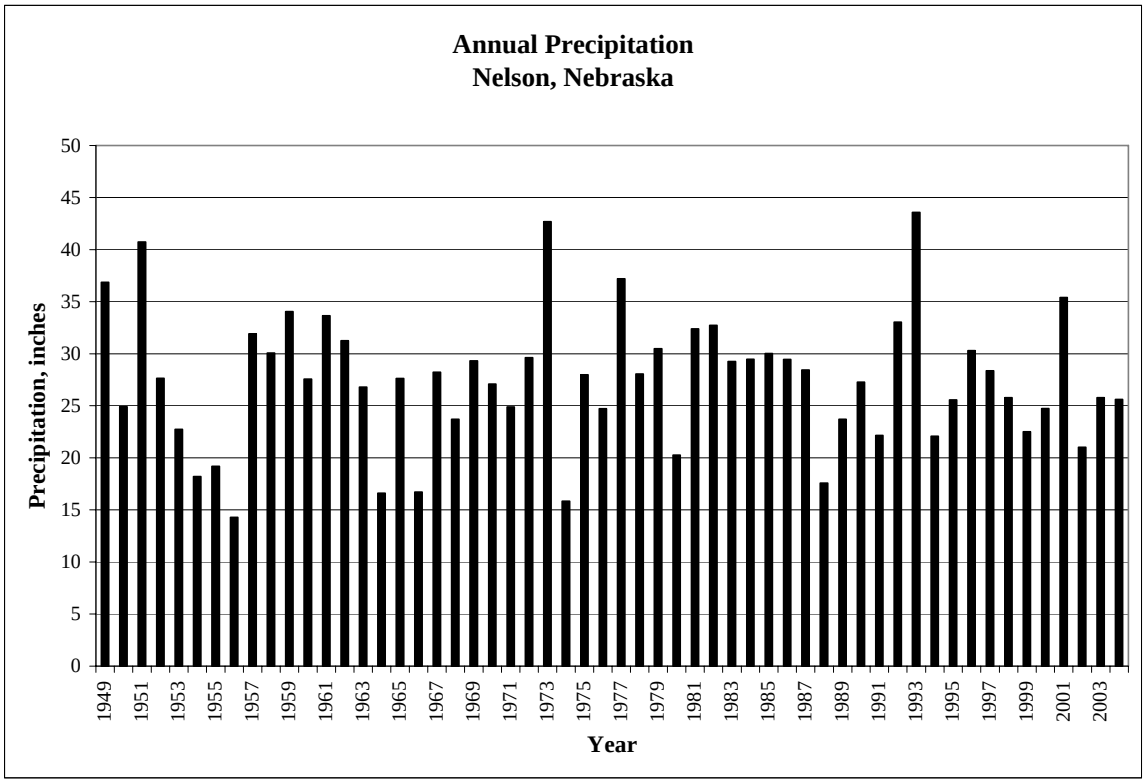
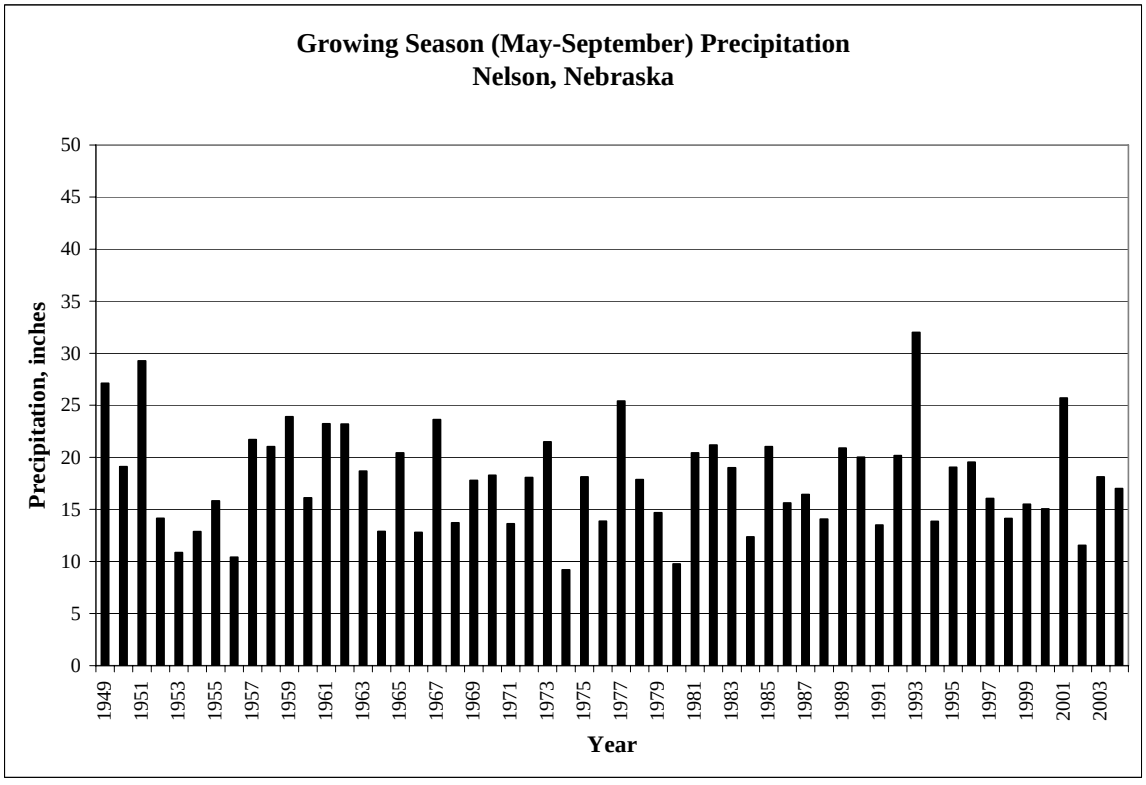


Figure LB-11. Growing Season (May-September) Precipitation at Nelson, Nebraska.



Planning and Assistance Division

Glacial Till

LITTLE BLUE RIVER BASIN

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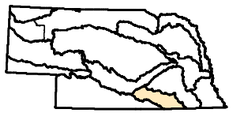
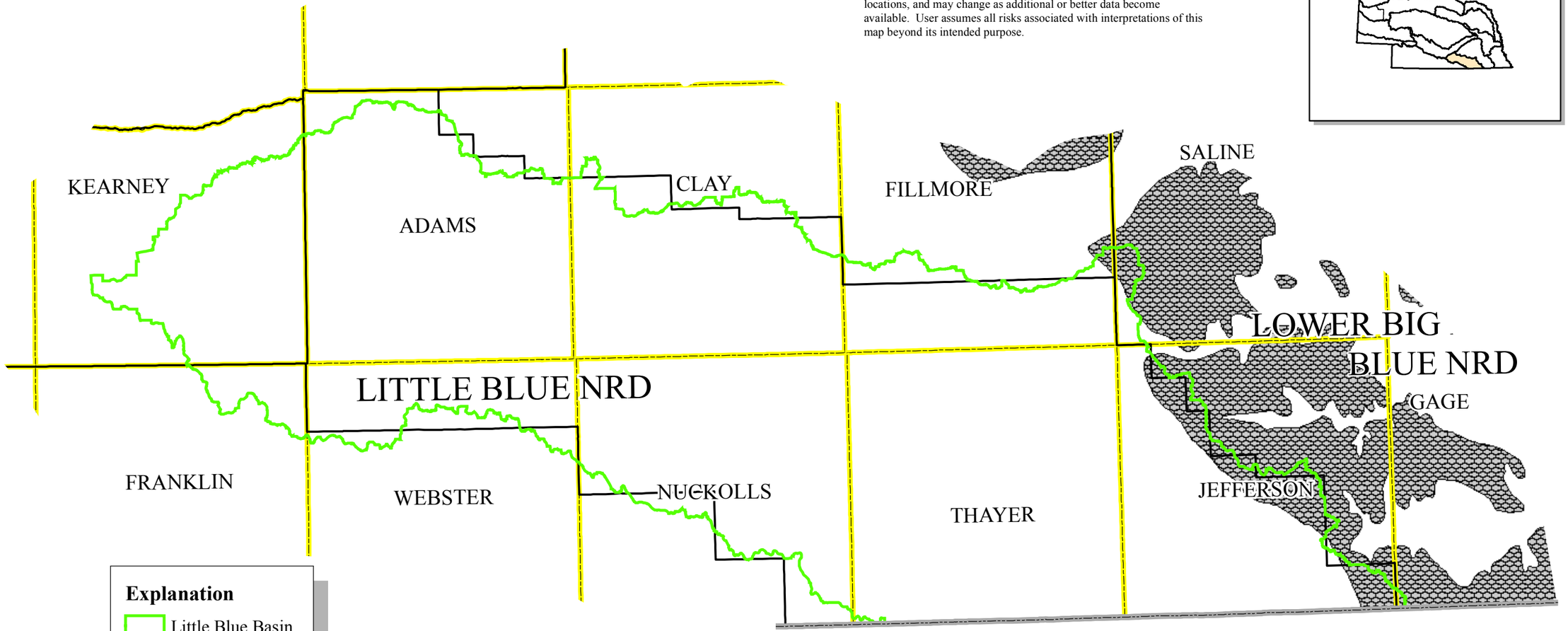
Location Map





Explanation

- Little Blue Basin
- Glacial Till

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

0 4 8 16 24 32 **Miles**

Glacial till information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Glacial till map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-12.

Table LB-1 – Aquifers in unconsolidated surficial deposits, (modified from Keech and Dreeszen, 1959, 1968)

System	Hydrogeologic unit	Character and description	Maximum thickness, in feet	Hydrogeologic characteristics
Quaternary (Pleistocene)	Undifferentiated fluvial and terrace deposits, Todd Valley sand.	Clay, silt, sand and fine gravel; underlie valley-side terraces and valley floor of drainage courses. Sand and gravel valley and terrace deposits, mostly along stream valleys.	30	Generally saturated, wells yield water at a moderate rate.
	Crete Formation, Undifferentiated fluvial, lacustrine and eolian deposits.	Sand and gravel channel-fill deposits. Silt, sand and gravel restricted to broad valleys.	130	Genereally saturated where thick and coarse textured, yields wells at a high rate.
	Sappa Formation	Stratified deposits of silt, clay sand and gravel.	60	Sand lenses yield water at a slow rate in wells.
	Grand Island Formation	Stream deposited sand and gravel with a persistent aqueous-eolian deposited silt and clay layer.	200	Yields abundant water to wells.
	Red Cloud sand and gravel and Holdrege Formation Undifferentiated	Stream deposited sand and gravel with nonpersistant silt and clay, probably of aqueous-eolian origin.	200	Yields abundant water to wells.

Table LB-2 – Characteristics of bedrock aquifers (modified from Keech and Dreeszen, 1959, 1968; LBNRD, 1995)

System	Hydrogeologic unit	Character and description	Maximum thickness, in feet	Hydrogeologic characteristics
Tertiary	Ogallala Group	Silt, sandy and clayey silt with lenses of sand and gravels, partly calcareous.	<100	Only used as a secondary aquifer, used mostly for stock and domestic wells.
Cretaceous	Niobrara Formation	Chalky Shale, weathered in parts	380	Yields water to wells at a moderate rate where creviced.
	Greenhorn-Graneros Formations (Undifferentiated)	The Graneros is non-calaceous plastio shale with thin limestone layer in the upper part. The Greenhorn is limestone to shaley limestone.	100	Not known to be a major source of water to wells, but some stock and domestic wells may get water from joints in the Greenhorn Limestone.
	Dakota Sandstone	Interbedded clay shale, sandy shale and sandstone.	600	Moderately to highly mineralized water, salinity appears to increase with depth. Sandstone layers yield water at a moderate rate to wells.
Permian	Undifferentiated limestone and shales	Interbedded limestone and shales.	700	Limestone used as minor aquifers, yield water to wells where secondary porosity has developed.

Planning and Assistance Division

Bedrock Geology

LITTLE BLUE RIVER BASIN

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Explanation

- Little Blue Basin

Bedrock Geology

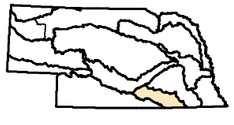
- Ogallala
- Pierre
- Niobrara
- Carlile
- Greenhorn-Graneros
- Dakota
- Chase
- Council Grove

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
LOWER BIG BLUE NRD
GAGE
LITTLE BLUE NRD
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON

Location Map



0 4 8 16 24 32 **Miles**

Bedrock geology information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Bedrock geology map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-13.

Planning and Assistance Division

Saturated Thickness

LITTLE BLUE RIVER BASIN

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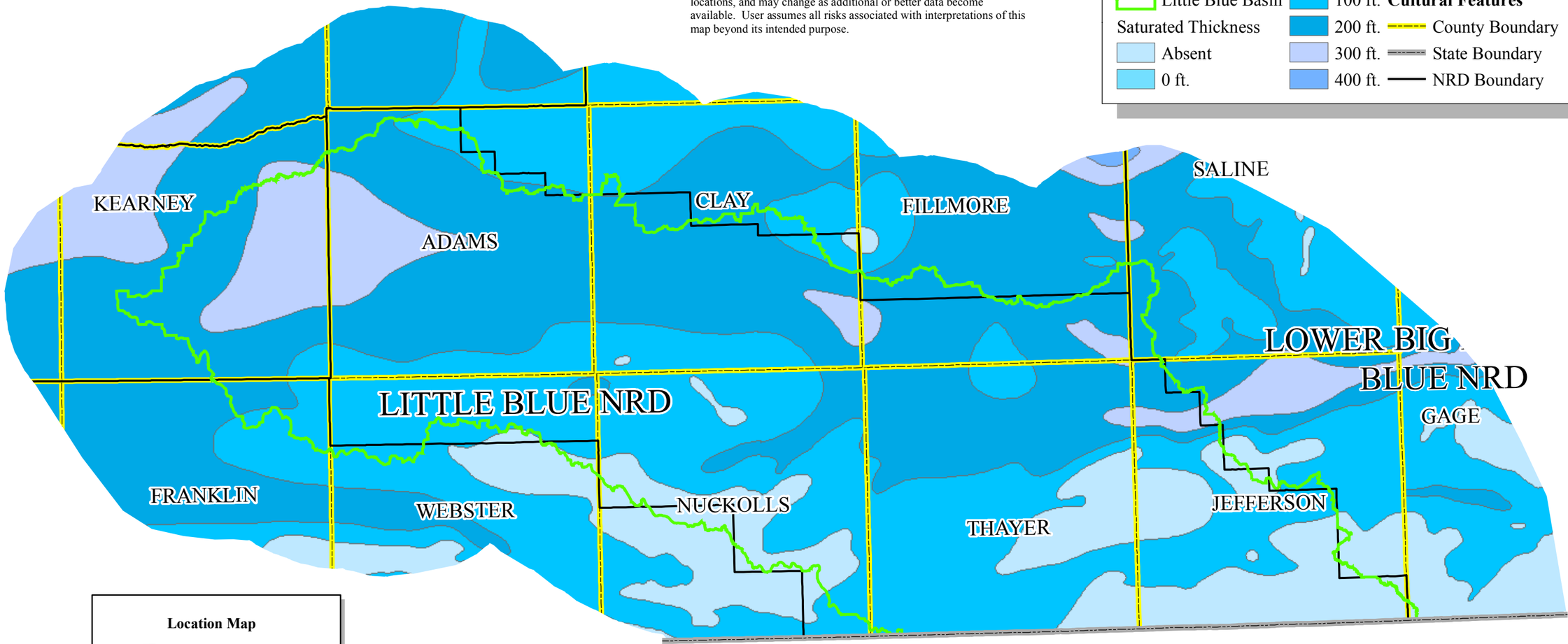
Explanation

- Little Blue Basin
- Saturated Thickness
  - Absent
  - 0 ft.
  - 100 ft.
  - 200 ft.
  - 300 ft.
  - 400 ft.
- **Cultural Features**
  - County Boundary
  - State Boundary
  - NRD Boundary



Location Map

0 4 8 16 24 32 **Miles**

Saturated thickness information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Saturated Thickness map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-14.

Planning and Assistance Division

Depth to Water

LITTLE BLUE RIVER BASIN

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Explanation

Little Blue Basin

Depth to Water

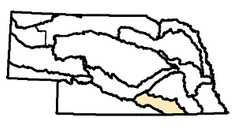
- 0 - 50 feet
- 50 - 100 feet
- 100-200 feet
- > 200 feet

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
LOWER BIG BLUE NRD
LITTLE BLUE NRD
GAGE
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON

Location Map



0 4 8 16 24 32 **Miles**

Depth to water information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Bedrock geology map produced by Kevin J. Schwartman, February 22, 2005

Figure LB-15.

Planning and Assistance Division

Transmissivity

LITTLE BLUE RIVER BASIN

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Explanation

- Little Blue Basin
- **Transmissivity**
- **Thousands of gal/day/ft**
- 20
- 50
- 100
- 150
- 200
- 250
- 300
- **Cultural Features**
- County Boundary
- State Boundary
- NRD Boundary

KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
LITTLE BLUE NRD
LOWER BIG BLUE NRD
GAGE
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON

Location Map

Transmissivity information provided by the UNL Conservation and Survey Division in: Summerside, S., Olafsen-Lackey, S., Goeke, J., and Myers, W., 2005, Mapping of Aquifer Properties – Transmissivity and Specific Yield – for Selected River Basins in Central and Eastern Nebraska.

0 4 8 16 24 32 **Miles**

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Transmissivity map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-16.

Planning and Assistance Division

Specific Yield

LITTLE BLUE RIVER BASIN

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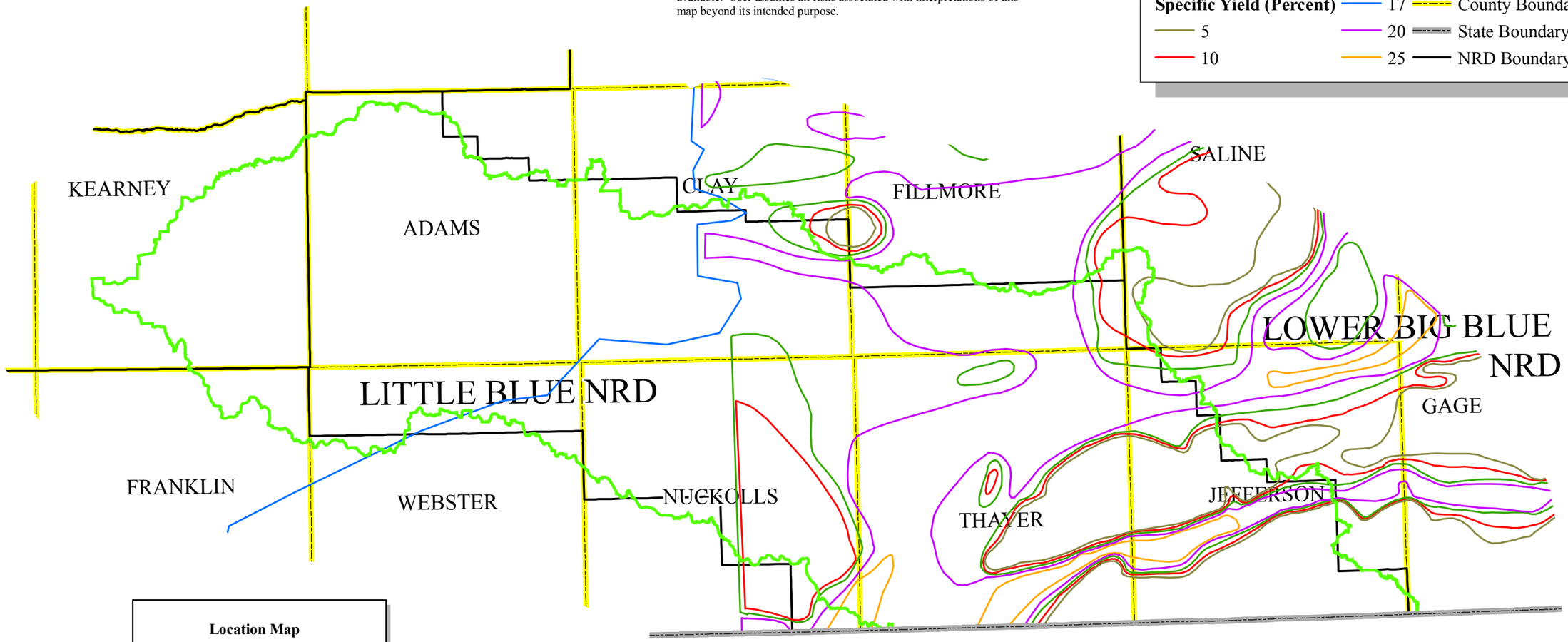
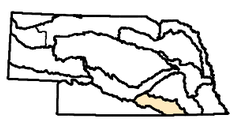
Explanation

- Little Blue Basin
- **Specific Yield (Percent)**
  - 5
  - 10
  - 15
  - 17
  - 20
  - 25
- **Cultural Features**
  - County Boundary
  - State Boundary
  - NRD Boundary



Location Map



0 4 8 16 24 32 **Miles**

Specific yield information provided by the UNL Conservation and Survey Division in: Summerside, S., Olafsen-Lackey, S., Goeke, J., and Myers, W., 2005, Mapping of Aquifer Properties – Transmissivity and Specific Yield – for Selected River Basins in Central and Eastern Nebraska.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Specific yield map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-17.

Planning and Assistance Division

1995 Ground Water Table

LITTLE BLUE RIVER BASIN

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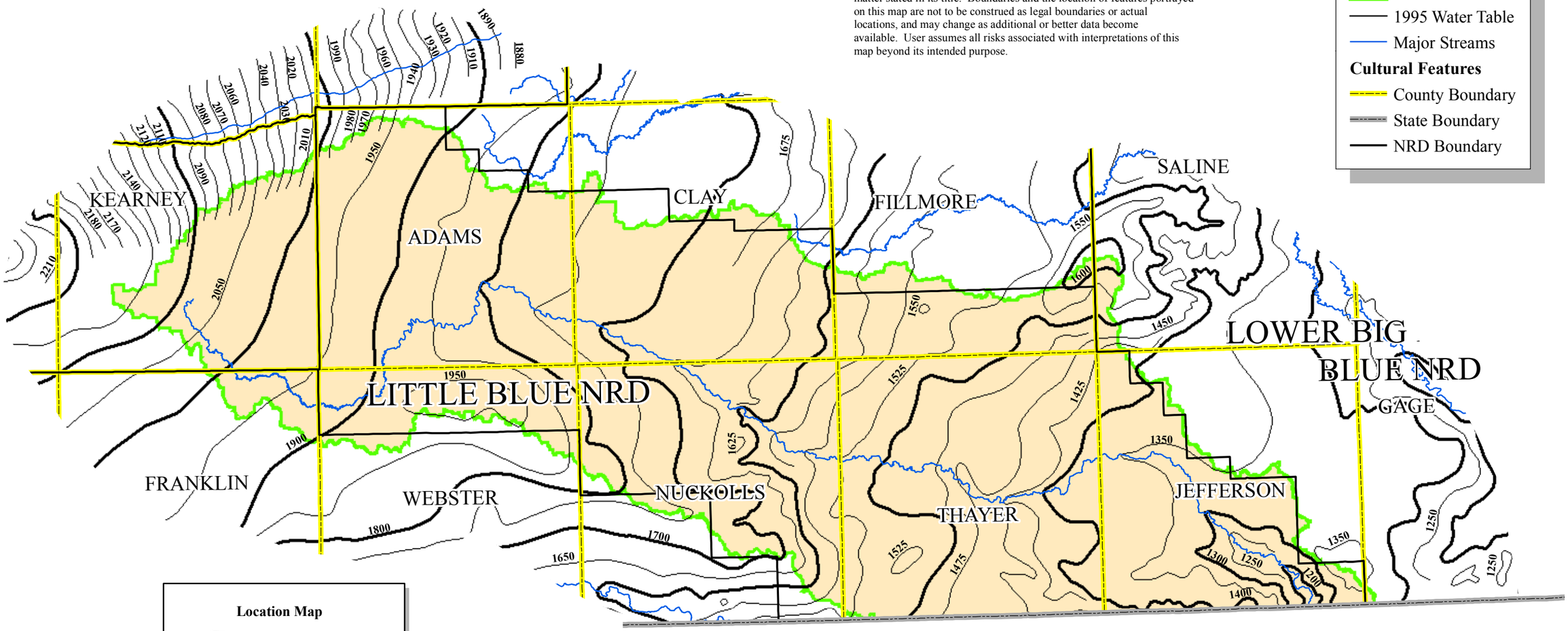
Explanation

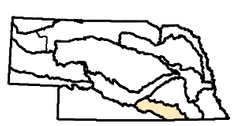
- Little Blue Basin
- 1995 Water Table
- Major Streams

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary



Location Map



0 4 8 16 24 32 Miles

Water table information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Water table map produced by Kevin J. Schwartman, October 8, 2005

Figure LB-18.

Planning and Assistance Division

Depletive Ground Water Wells

LITTLE BLUE RIVER BASIN

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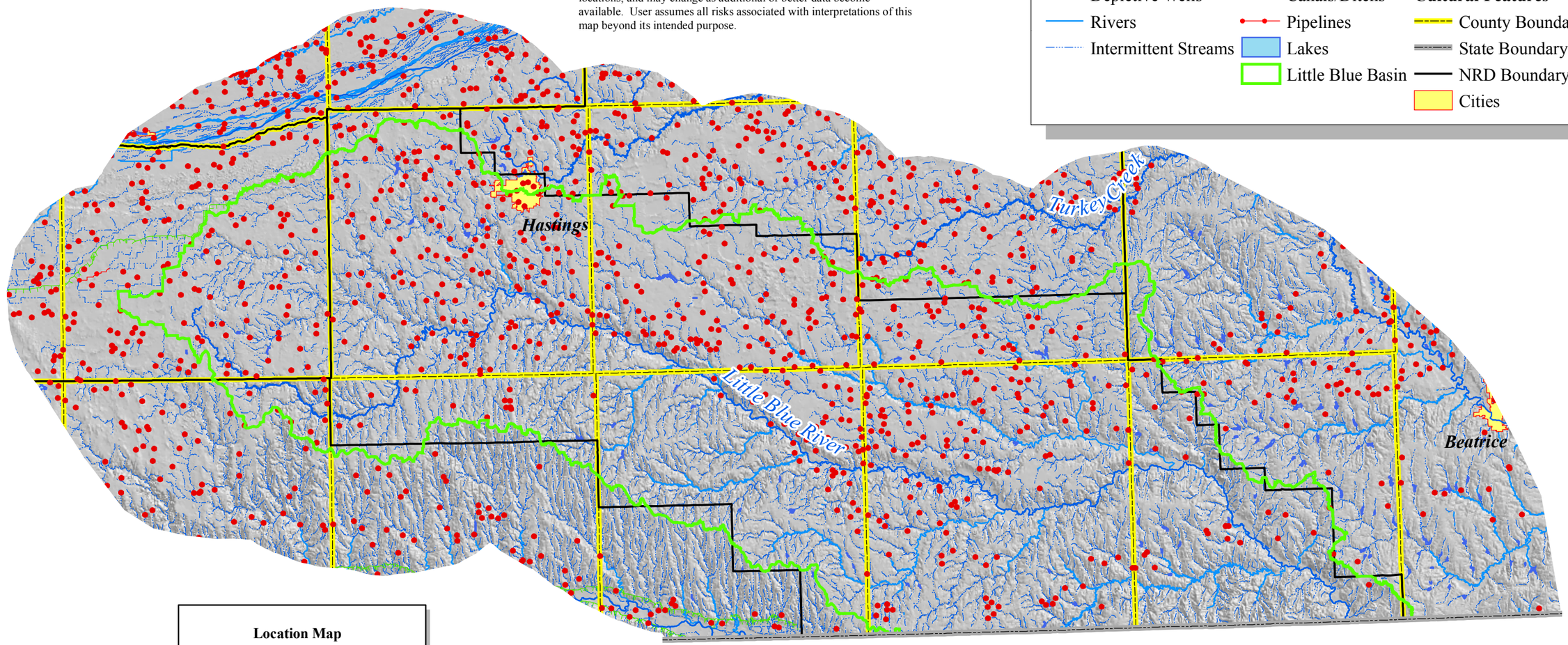
Explanation

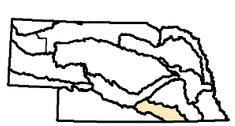
- Depletive Wells
- Rivers
- Intermittent Streams
- Canals/Ditchs
- Pipelines
- Lakes
- Little Blue Basin

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary
- Cities



Location Map



0 4 8 16 24 32 Miles

Depletive well infomation is from the DNR Registered Ground Water Well Database, as of January 2005 and include wells used for aquiculture, commercial, domestic, irrigation, public water supply, dewatering, stock and others except wells for non-consumptive uses.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Depletive ground water wells map produced by Shuhai Zheng, October 8, 2005.

Figure LB-19.

Department of Natural Resources

Planning and Assistance Division

High Capacity Wells by Completion Years

LITTLE BLUE RIVER BASIN

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Explanation

Surface Water Features
- Rivers
- Intermittent Streams
- Canals/Ditchs
- Pipelines
- Lakes
- Little Blue Basin

High Capacity Wells
- Pre - 1940 wells
- 1940 - 1959 wells
- 1960 - 1979 wells
- 1980 - 1999 wells
- Post - 1999 wells

Cultural Features
- County Boundary
- State Boundary
- NRD Boundary
- Cities

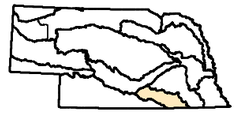
Hastings

Turkey Creek

Little Blue River

Beatrice

Location Map



High Capacity well infomation is from the DNR Registered Ground Water Well Database, as of January 2005 and includes depletive wells with regisered pumping rates equal to or greater than 50 gpm.

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0 4 8 16 24 32 Miles

Figure LB-20

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
High capacity wells map produced by Shuhai Zheng, November 10, 2005.

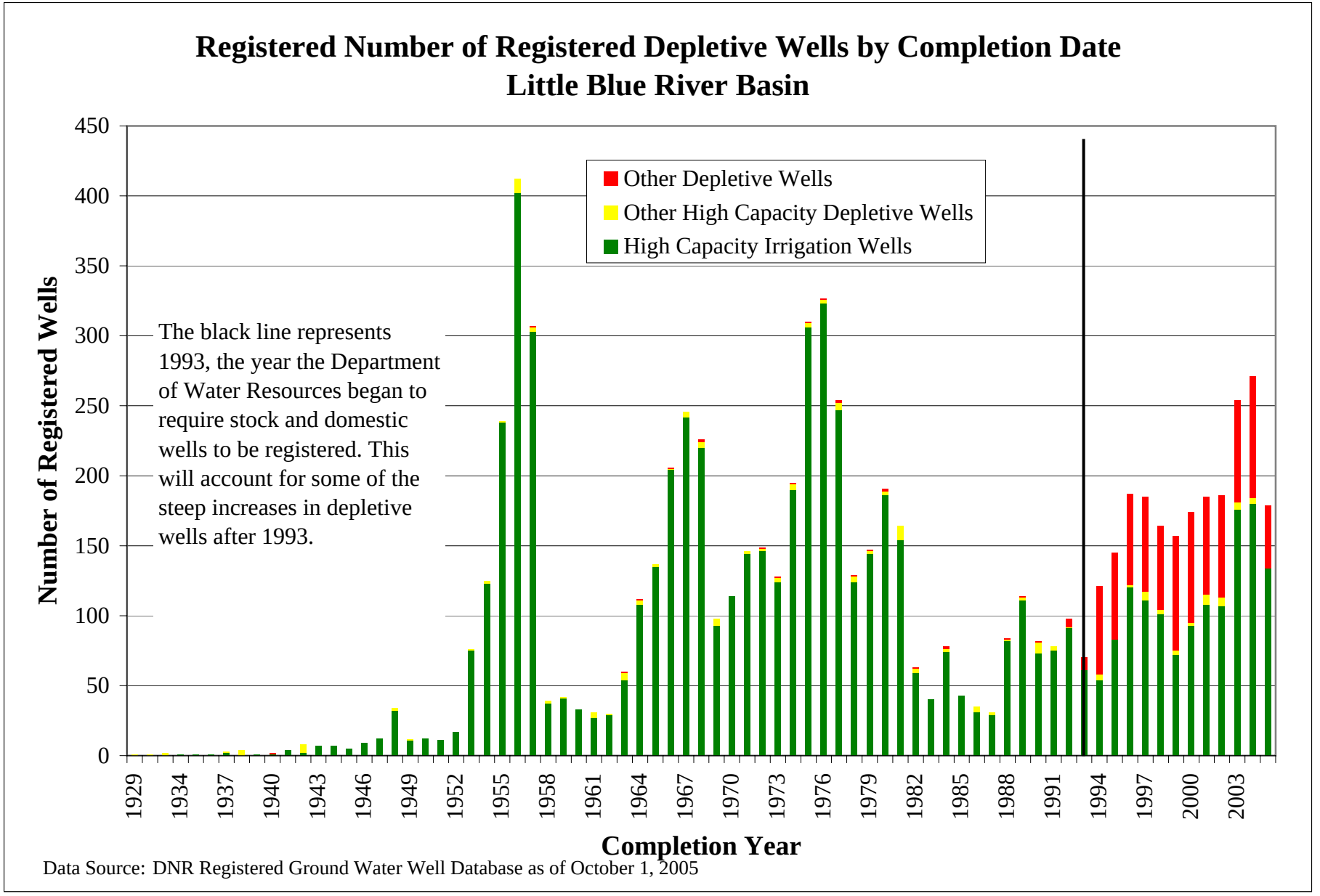

Figure LB-21

By Shuhai Zheng, 12/8/2005

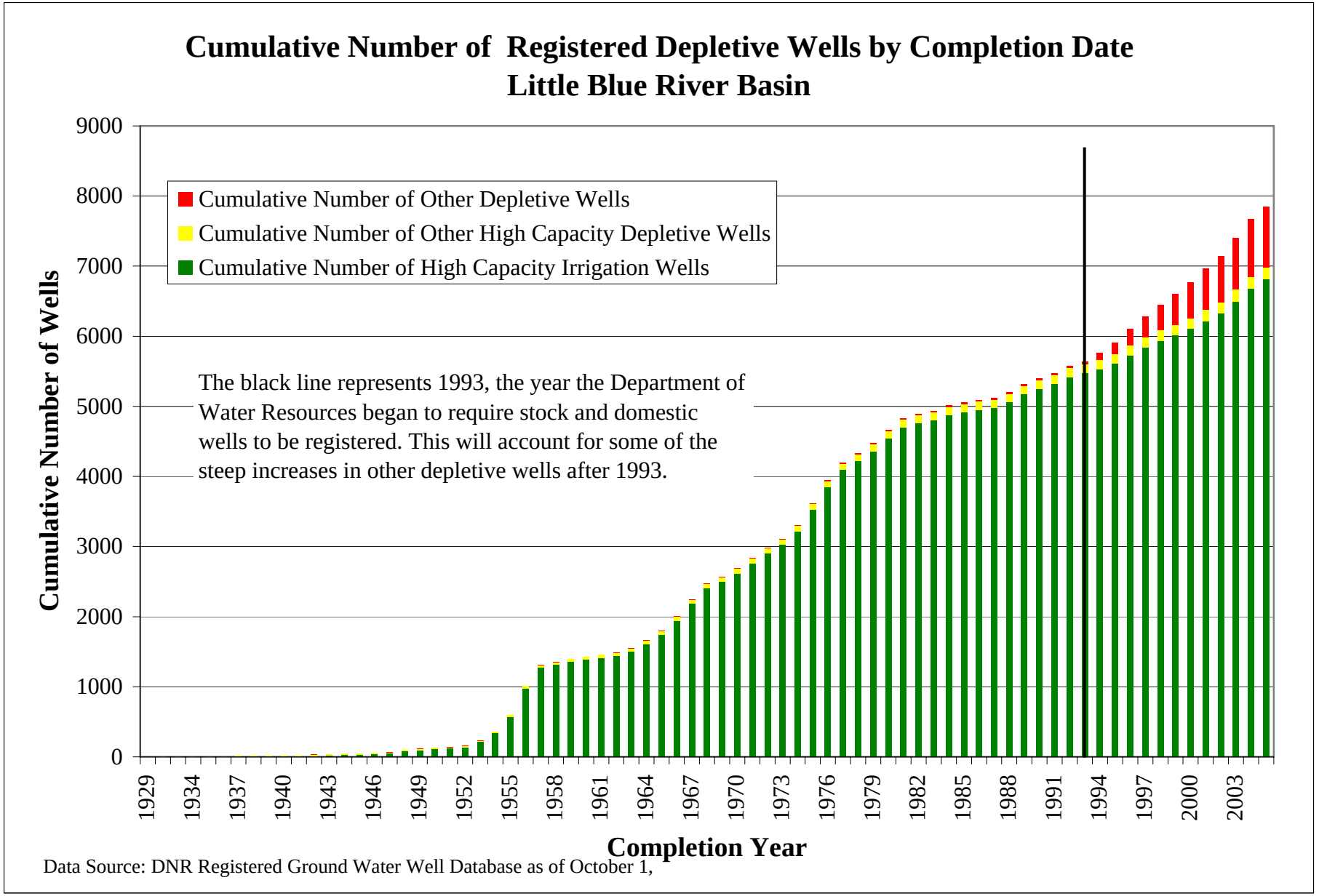

Figure LB-22

By Shuhai Zheng, 12/8/2005

Table LB-3 Average Irrigated Acreage 1950-2003 for Counties Fully or Partially in the Little Blue River Basin

	Estimated Average Irrigated Acreage by County						
County Name	*Percent of County in Little Blue Basin*	*1950-1959*	*1960-1969*	*1970-1979*	*1980-1989*	*1990-1999*	*2000-2003*
Adams	82	22264	61615	111238	152700	187060	207475
Clay	55	29905	78883	130291	170860	184410	190275
Fillmore	29	23749	69542	125433	164980	192560	203450
Franklin	7	10369	27791	52251	72030	84870	94625
Gage	<1	2719	15576	36687	45190	49700	57275
Jefferson	57	2457	13277	34948	52920	58380	67850
Kearney	45	40407	72317	128504	165480	190820	207250
Nuckolls	66	11755	26306	40191	51050	55820	62525
Saline	3	6762	27831	56187	70740	80140	89875
Thayer	100	12316	41839	75456	102060	121410	134225
Webster	25	4216	11142	25024	35490	45540	54200
Total		**166919**	**446119**	**816210**	**1083500**	**1250710**	**1369025**
% Change from Previous 10 Years			167.27%	82.96%	32.75%	15.43%	9.46%

* The percentage is the percentage of the county area which is in the Little Blue Basin. It does not necessarily represent the percentage of irrigated county acreage in the Little Blue River Basin.

Data Source: http://www.usda.gov/nass/, National Agricultural Statistics Service**, U.S. Department of Agriculture**

Shuhai Zheng, November 23, 2005

Ground Water-level Changes Pre-development to 2005

LITTLE BLUE RIVER BASIN

Planning and Assistance Division

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Explanation

- Little Blue Basin

Ground Water Level Changes

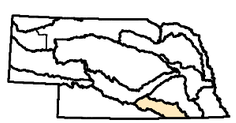
- -20.00 to -29.99 feet
- -10.00 to -19.99 feet
- -5.00 to -9.99 feet
- 5.00 to 9.99 feet
- 10.00 to 19.99 feet
- 20.00 to 29.99 feet
- 30.00 to 39.99 feet

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
LOWER BIG BLUE NRD
GAGE
LITTLE BLUE NRD
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON

Location Map



Ground water changes information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Figure LB-23.

0 4 8 16 24 32 **Miles**

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Ground water Level Changes added by Shuhai Zheng, October 8, 2005

Planning and Assistance Division

Hydrograph Locations

LITTLE BLUE RIVER BASIN

N
W E
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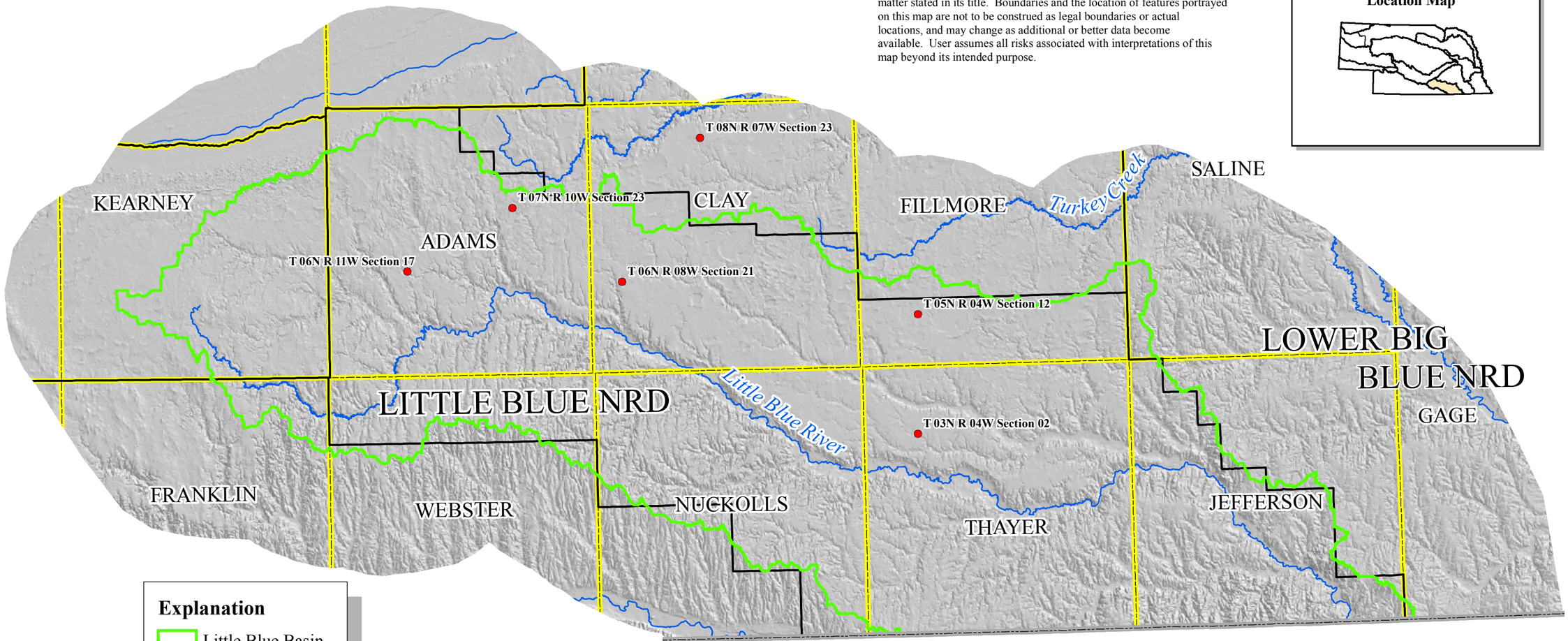
Location Map



Explanation

- Little Blue Basin
- Well Hydrographs

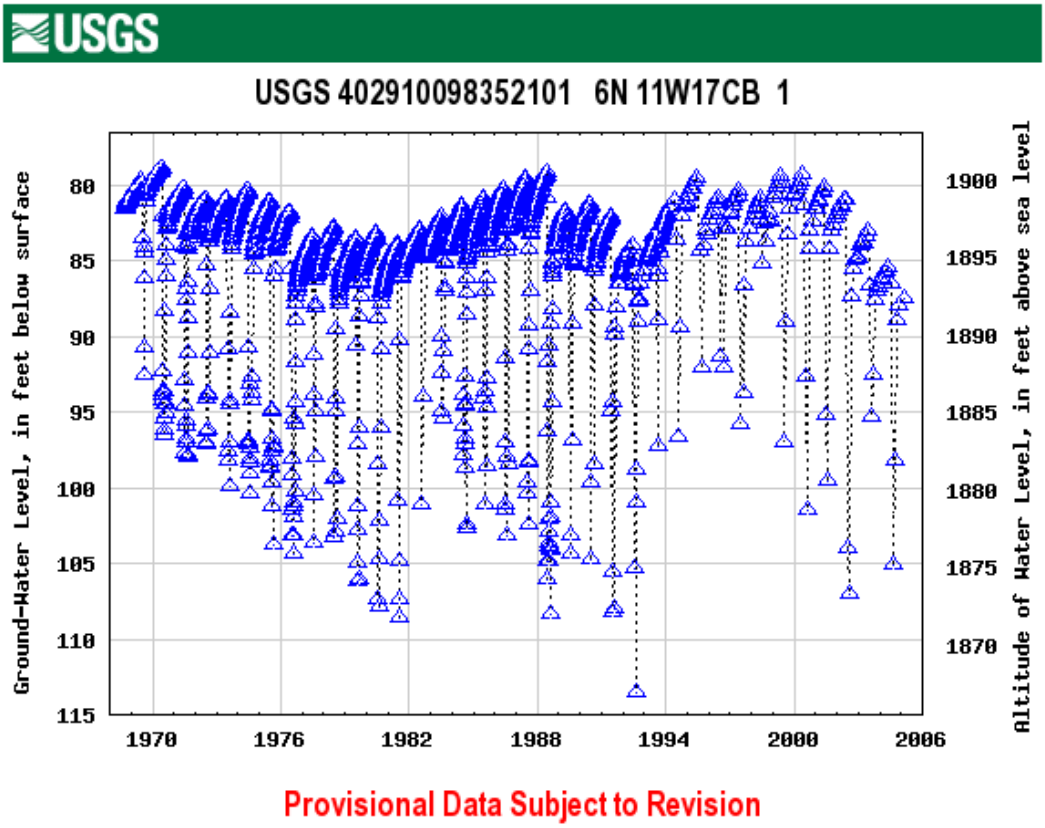
Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

0 4 8 16 24 32 **Miles**

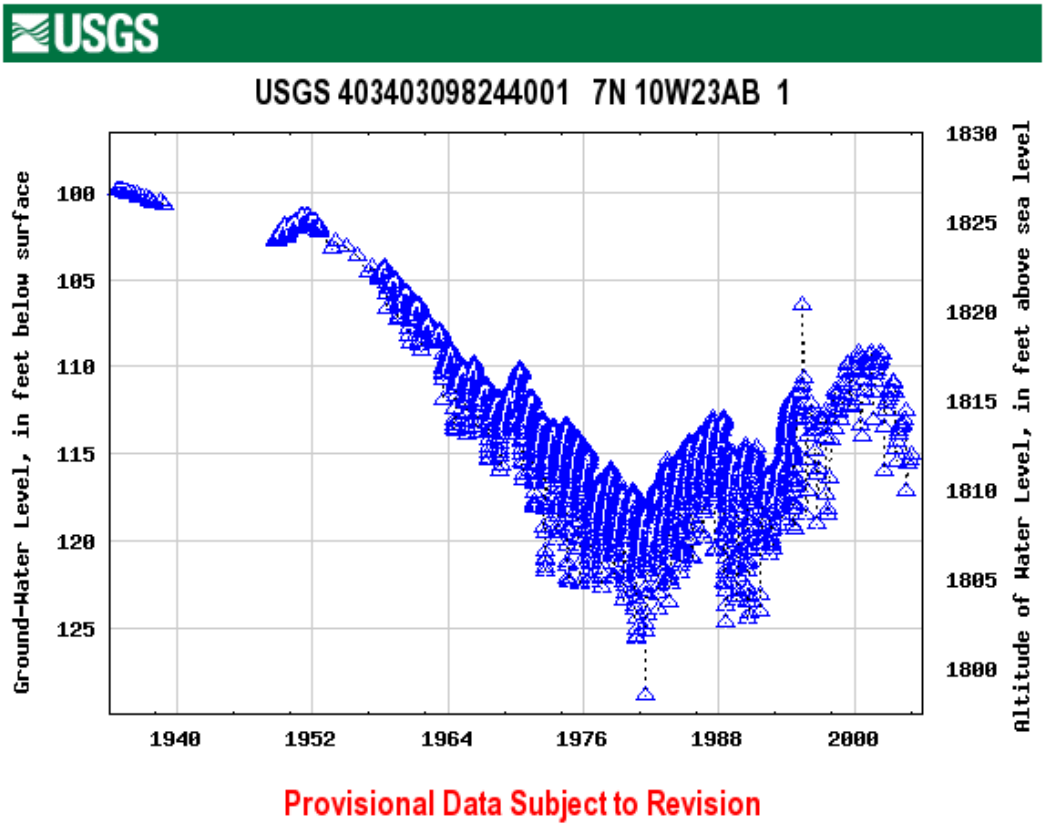
Figure LB-24.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Precipitation gages map produced by Kevin Schwartman, November 2, 2005.



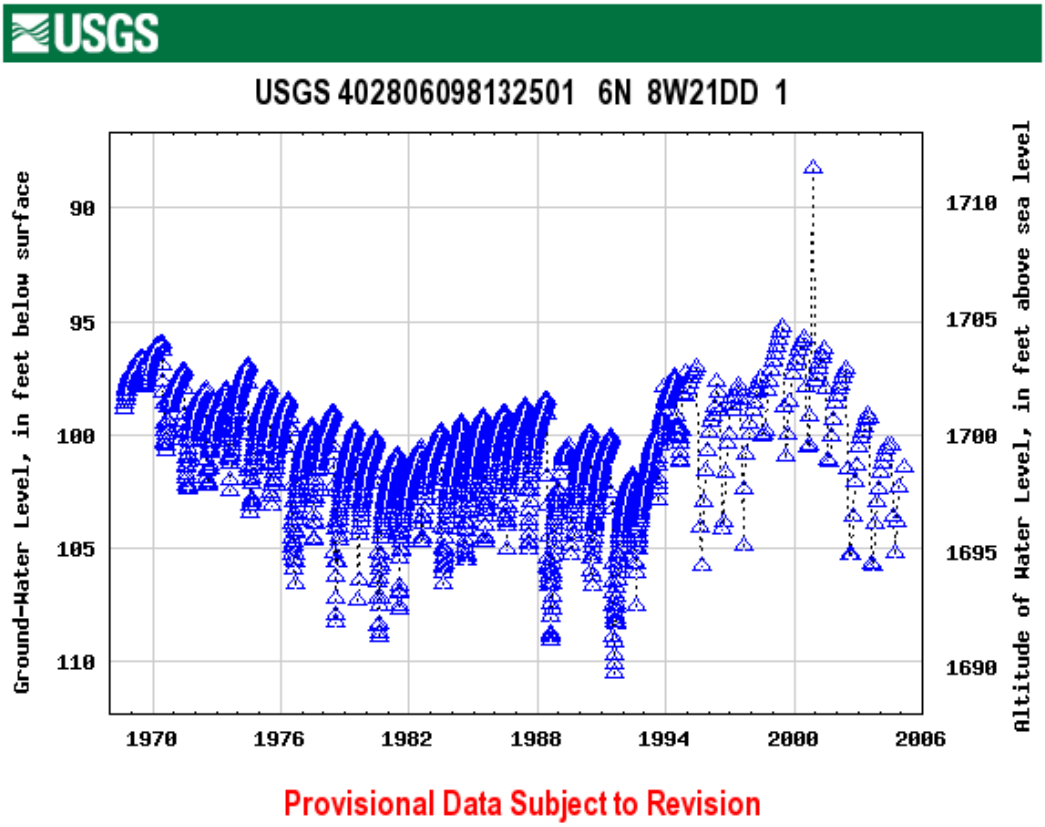
Adams County, Nebraska
Hydrologic Unit Code 10270206
Latitude 40°29'10", Longitude 98°35'21" NAD27
Land-surface elevation 1,980. feet above sea level NGVD29
The depth of the well is 210 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-25



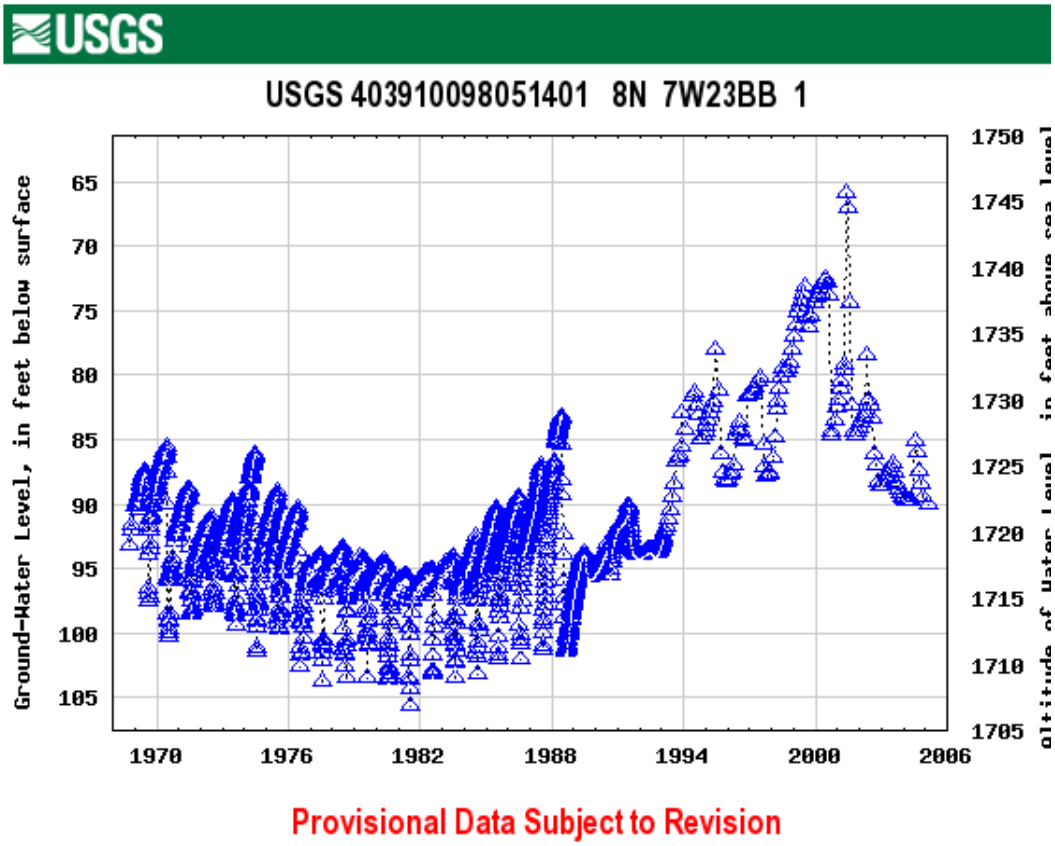
Adams County, Nebraska
Hydrologic Unit Code 10270206
Latitude 40°34'03", Longitude 98°24'40" NAD27
Land-surface elevation 1,927. feet above sea level NGVD29
The depth of the well is 155 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-26



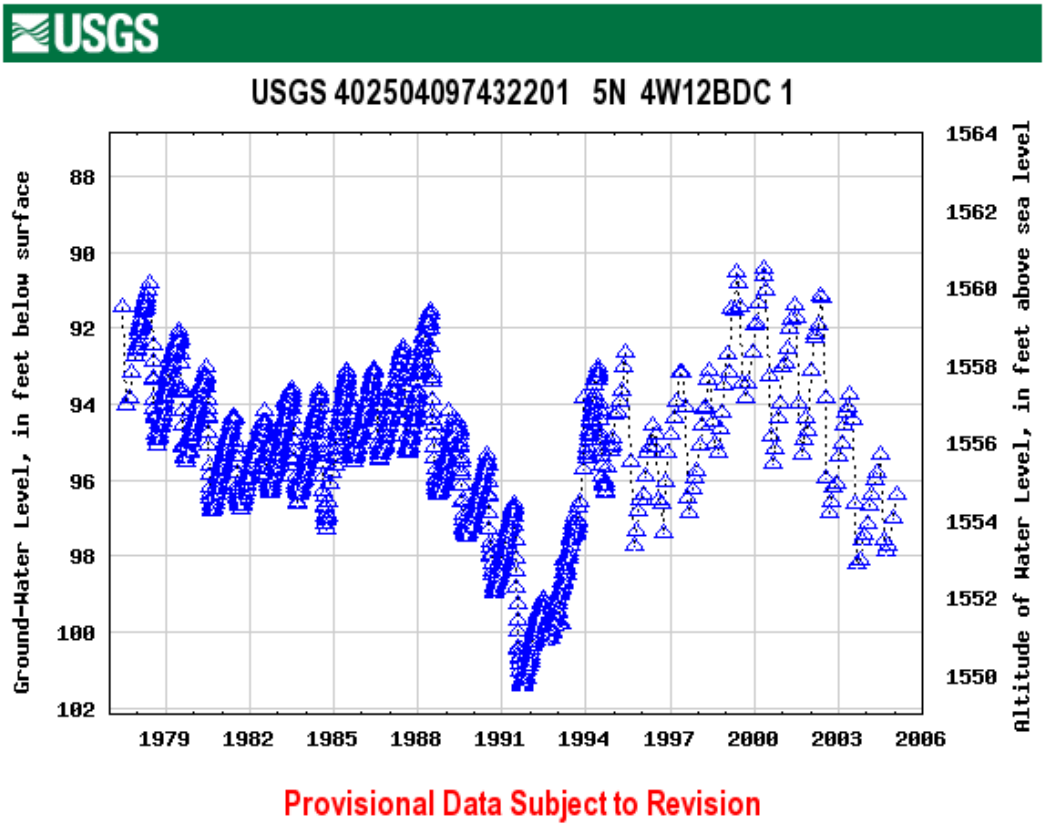
Clay County, Nebraska
Hydrologic Unit Code 10270206
Latitude 40°28'06", Longitude 98°13'25" NAD27
Land-surface elevation 1,800. feet above sea level NGVD29
The depth of the well is 205 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-27



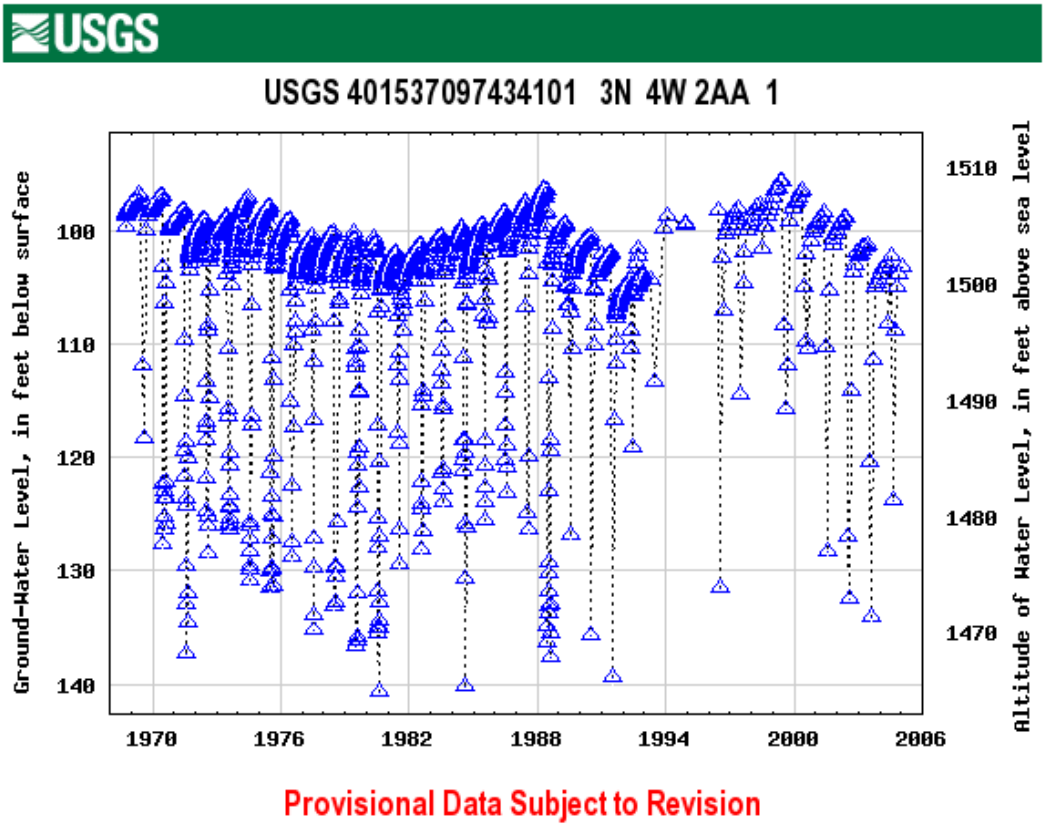
Clay County, Nebraska
Hydrologic Unit Code 10270203
Latitude 40°39'10", Longitude 98°05'14" NAD27
Land-surface elevation 1,812. feet above sea level NGVD29
The depth of the well is 206 feet below land surface.
This well is completed in the This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-28



Fillmore County, Nebraska
Hydrologic Unit Code 10270206
Latitude 40°25'04", Longitude 97°43'22" NAD27
Land-surface elevation 1,651. feet above sea level NGVD29
The depth of the well is 260 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-29



Thayer County, Nebraska
Hydrologic Unit Code 10270206
Latitude 40°15'37", Longitude 97°43'41" NAD27
Land-surface elevation 1,605.00 feet above sea level NGVD29
The depth of the well is 195 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure LB-30

Planning and Assistance Division

Stream Gages

LITTLE BLUE RIVER BASIN

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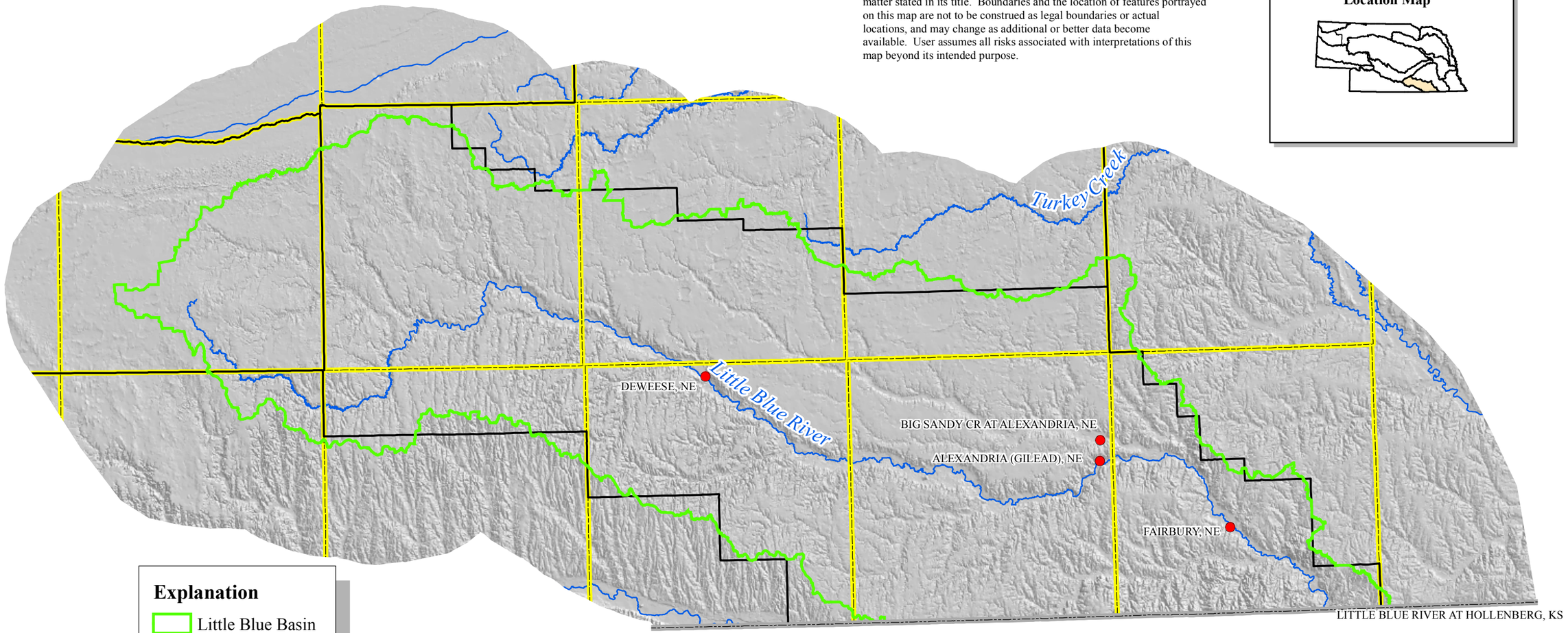
Location Map



Explanation

- Little Blue Basin
- Stream Gages

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

0 4 8 16 24 32 **Miles**

Figure LB-31.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Stream gages map produced by Jeff Shafer, October 19, 2005.

Figure LB-32. Annual Flows, Big Sandy Creek at Alexandria.

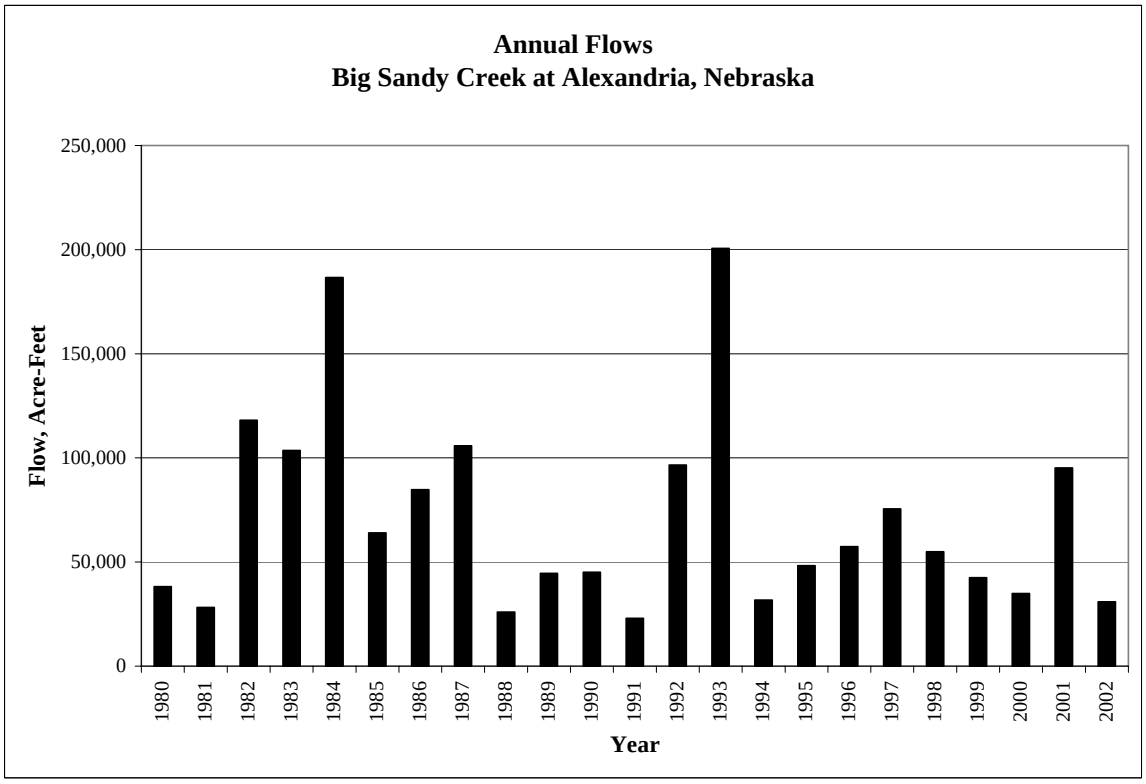


Figure LB-33. Annual Flows, Little Blue River at Deweese.

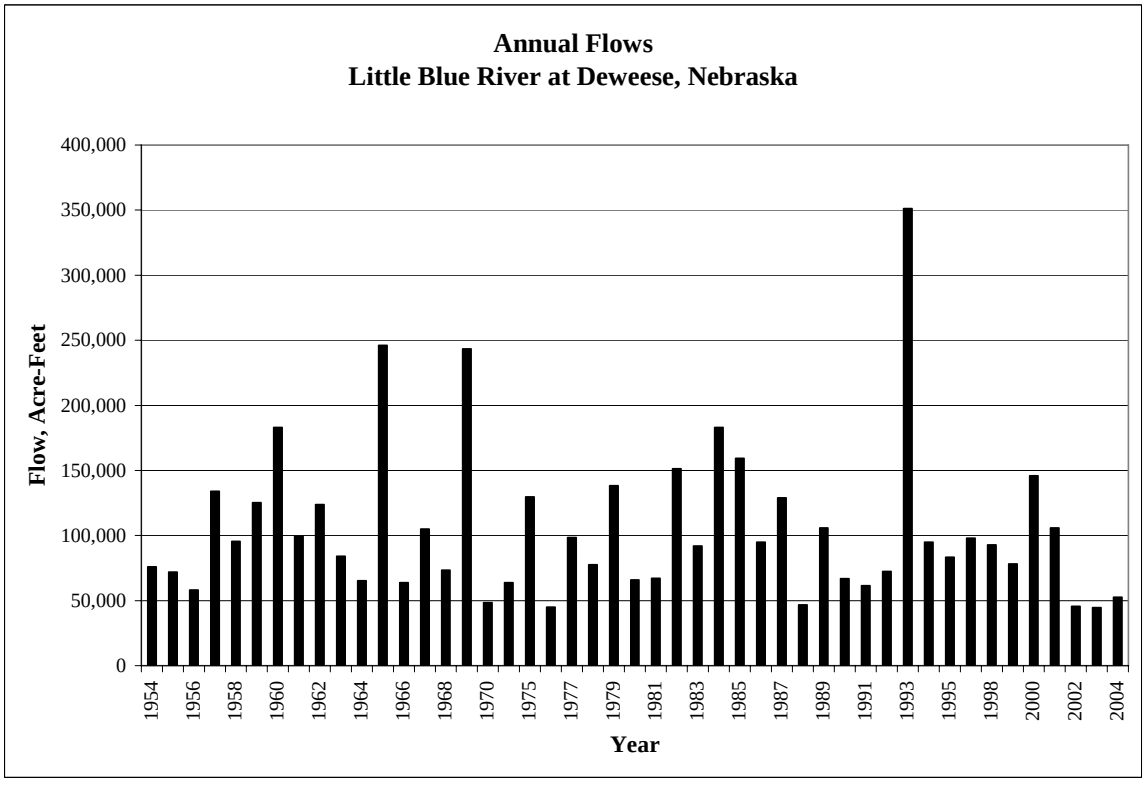


Figure LB-34. Annual Flows, Little Blue River at Alexandria.

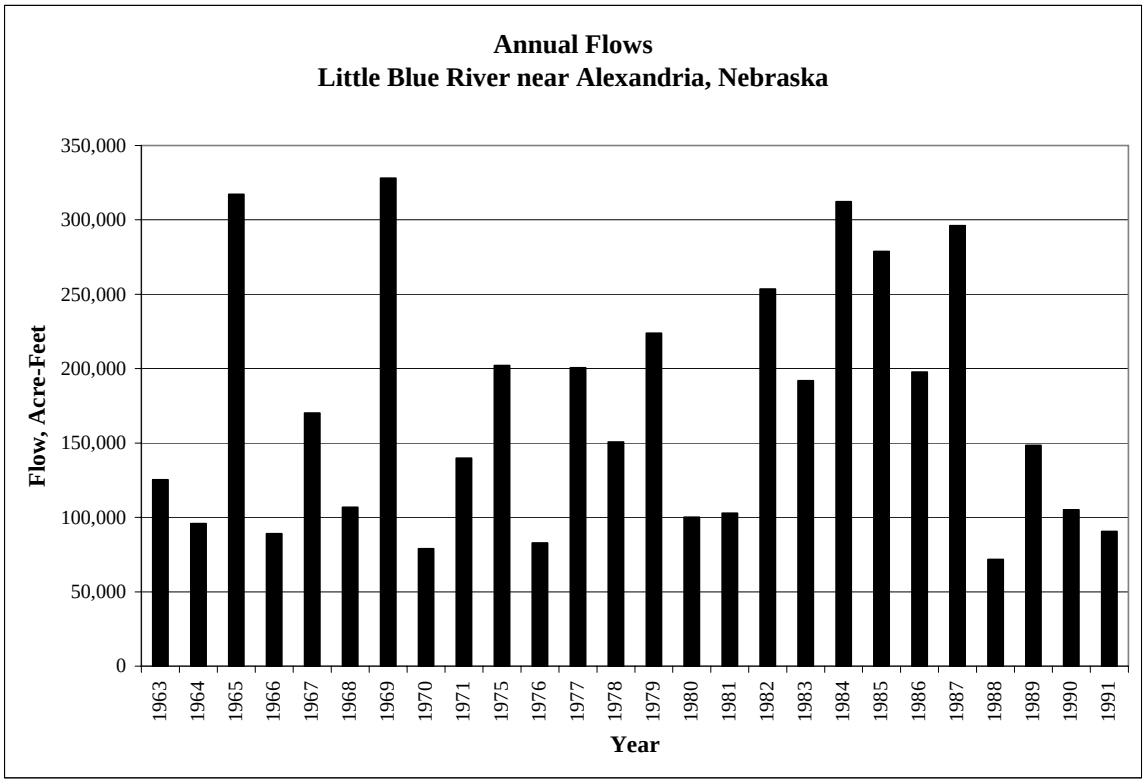


Figure LB-35. Annual Flows, Little Blue River near Fairbury.

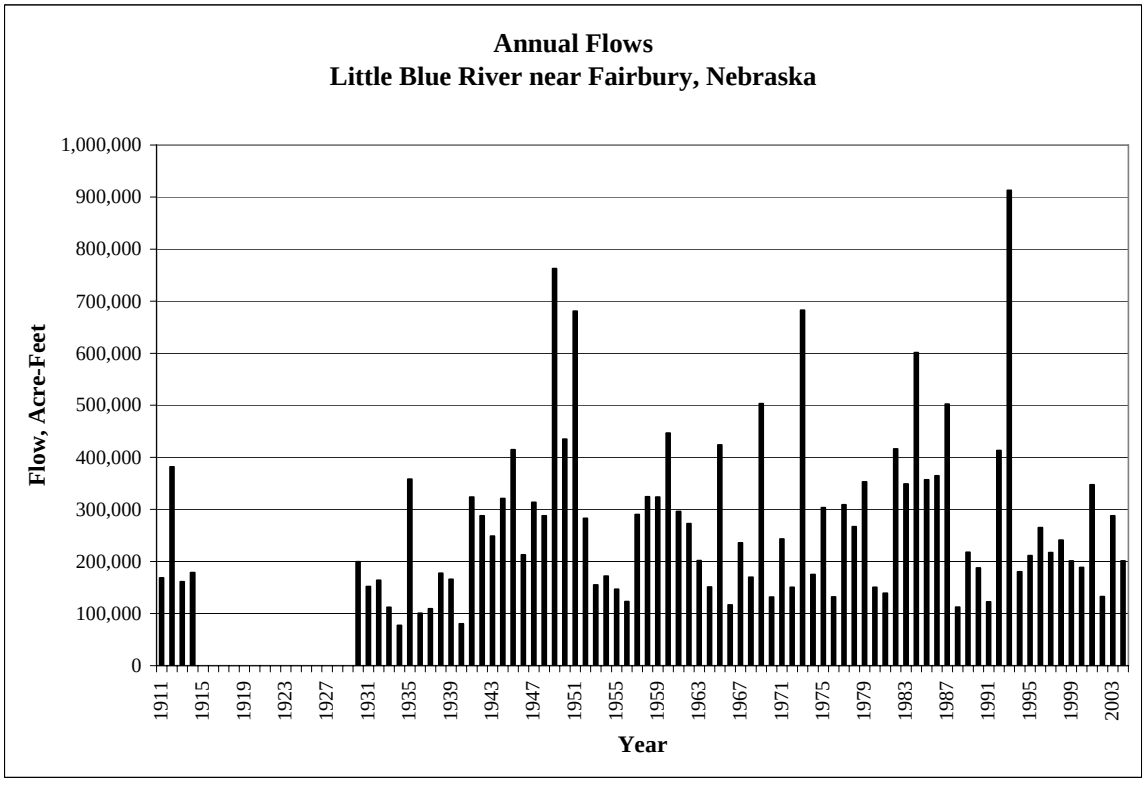
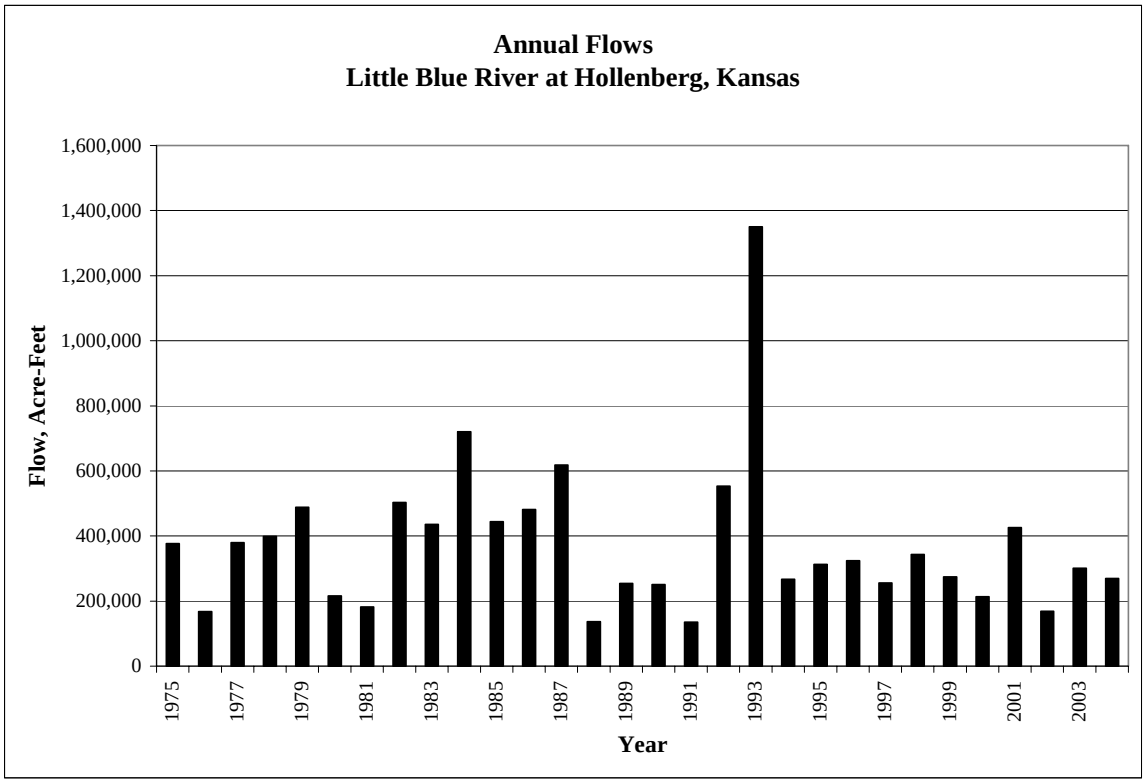


Figure LB-36. Annual Flows, Little Blue River at Hollenberg, Kansas.



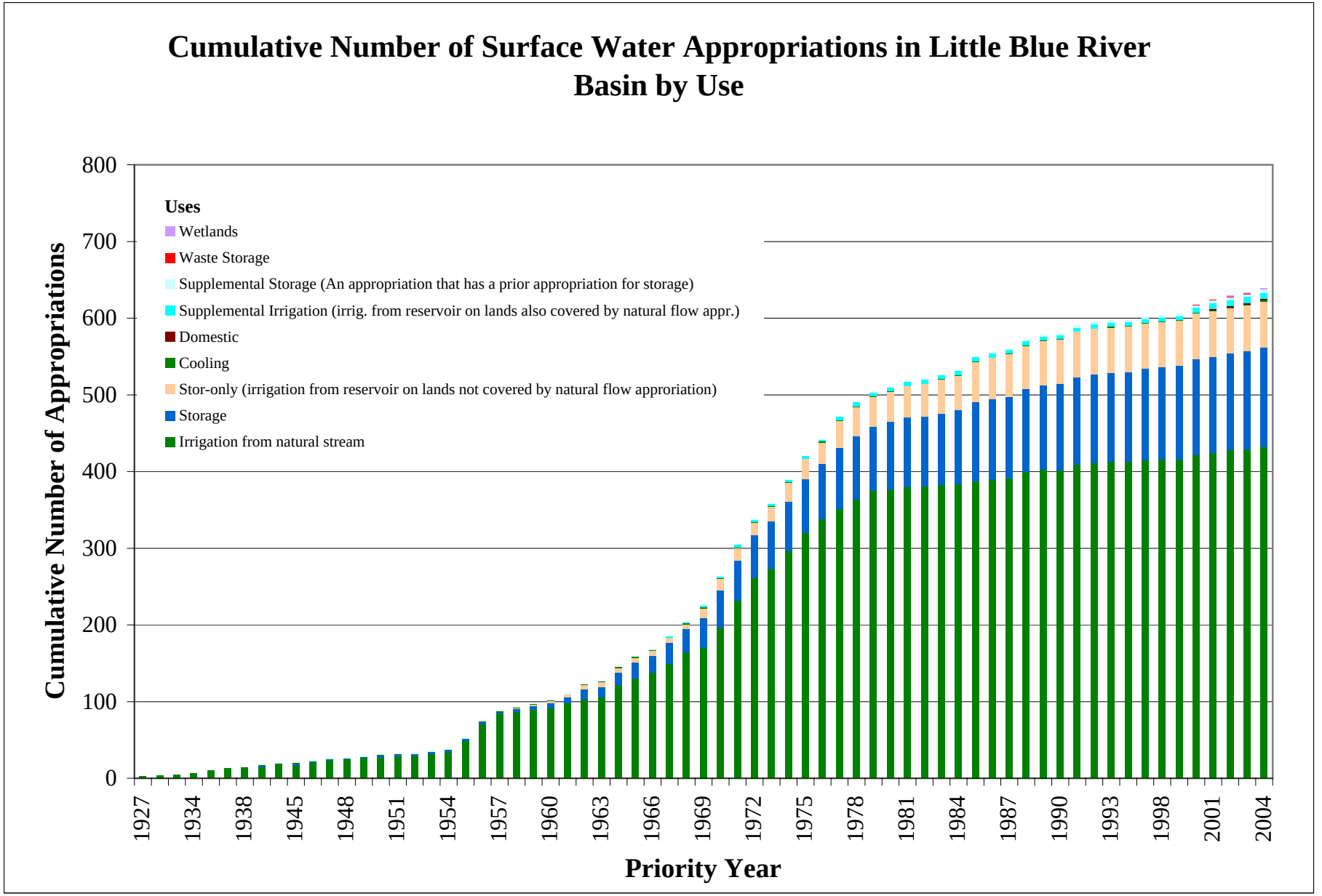


Figure LB-37

11/23/2005 by Shuhai Zheng

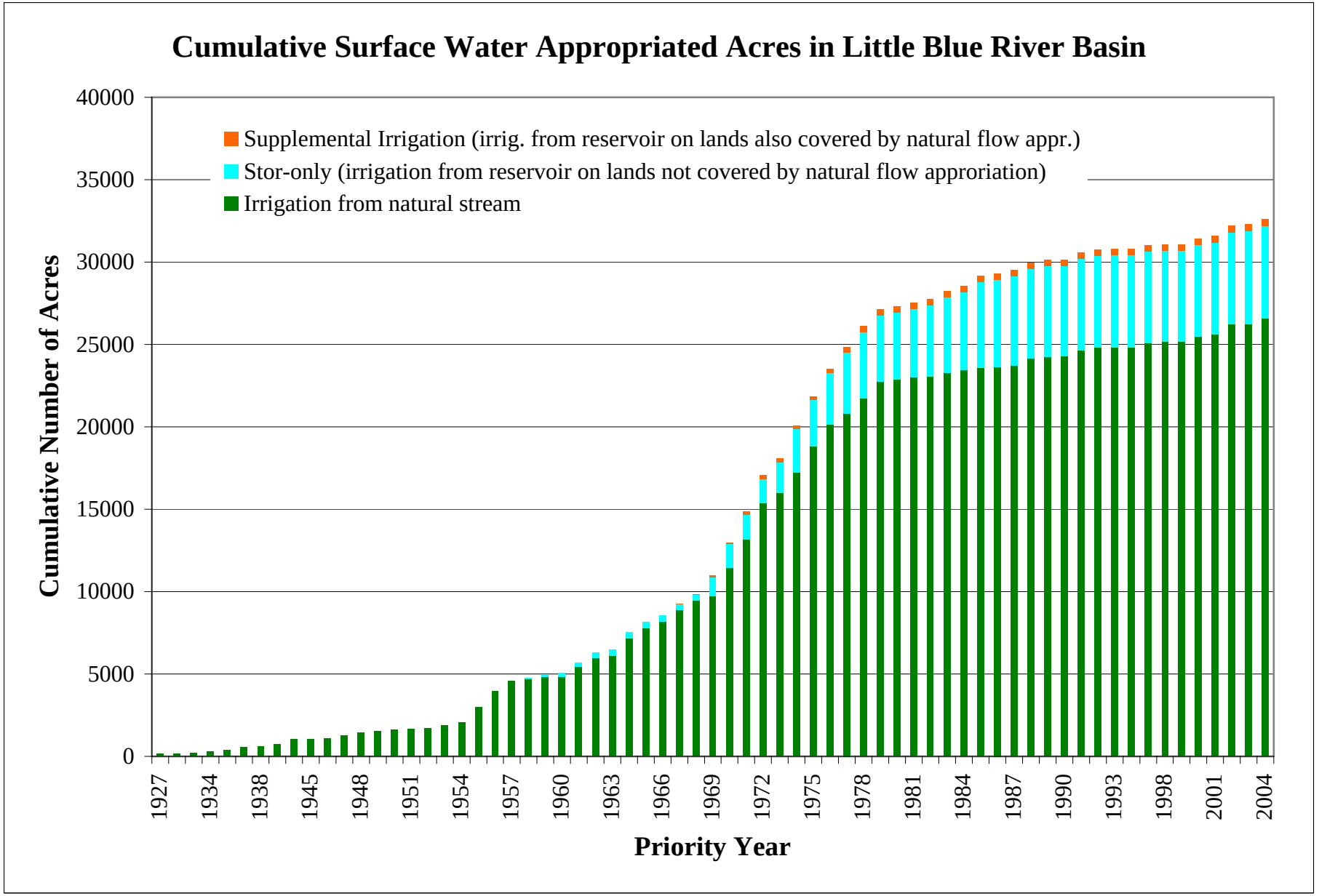


Figure LB-38

11/23/2005 by Shuhai Zheng

Planning and Assistance Division

Surface Water Irrigation Locations

LITTLE BLUE RIVER BASIN

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W E
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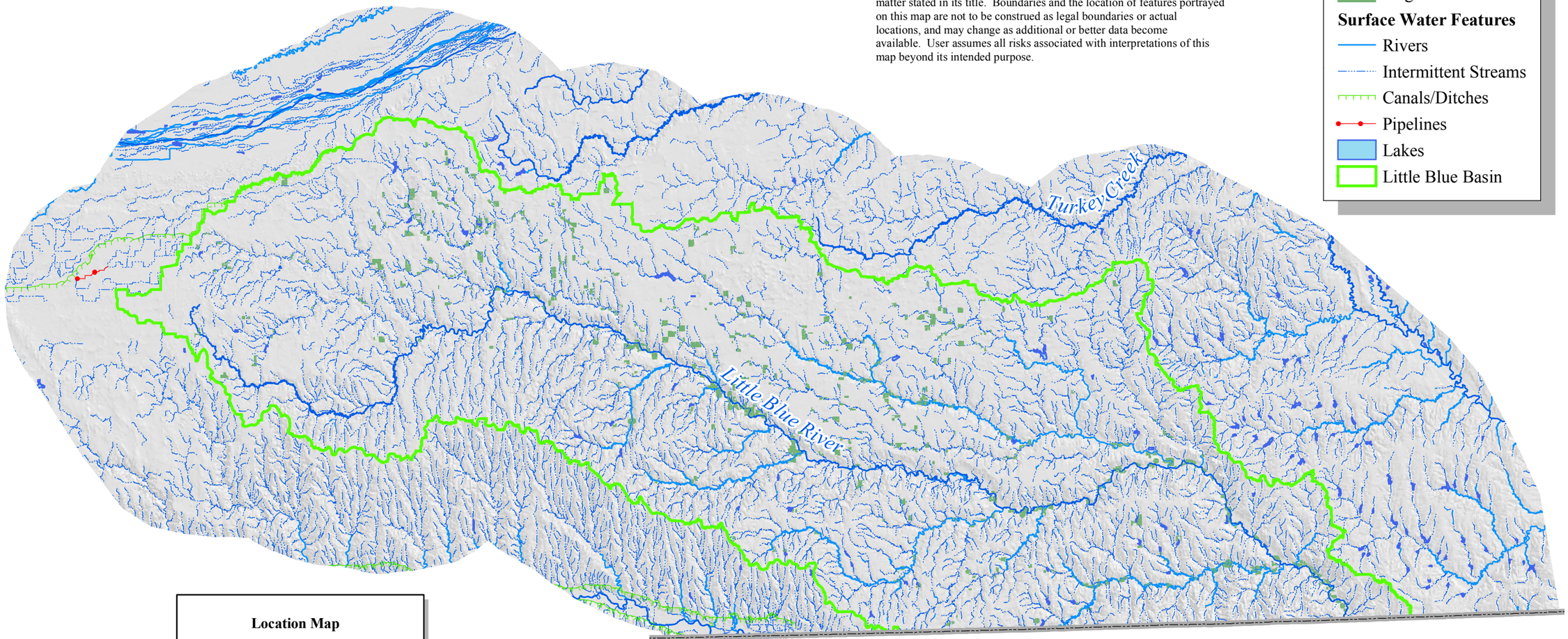


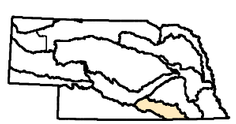
Explanation

- Irrigation Locations

Surface Water Features

- Rivers
- Intermittent Streams
- Canals/Ditches
- Pipelines
- Lakes
- Little Blue Basin

Location Map



Surface water irrigation location information digitized by DNR staff from surface water irrigation application maps.

0 4 8 16 24 32 Miles

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Surface water irrigation locations map produced by Jeff Shafer, October 12, 2005

Figure LB-39.

Planning and Assistance Division

Corn Irrigation Requirement

LITTLE BLUE RIVER BASIN

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Explanation

- Little Blue Basin
- Corn Irrigation Requirement

Cultural Features

- County Boundary
- State Boundary
- NRD Boundary

KEARNEY
ADAMS
CLAY
FILLMORE
SALINE
LITTLE BLUE NRD
LOWER BIG BLUE NRD
GAGE
FRANKLIN
WEBSTER
NUCKOLLS
THAYER
JEFFERSON

Location Map

Figure LB-40.

0 4 8 16 24 32 **Miles**

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Transmissivity map produced by Kevin J. Schwartman, December 7, 2005

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